

Methodology to Estimate the Quantity, Composition, and Management of Construction and Demolition Debris in the United States

U.S. Environmental Protection Agency
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Waste Management Branch, National Risk Management Research Laboratory
Cincinnati Ohio

Notice

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Foreword

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Cynthia Sonich-Mullin, Director
National Risk Management Research Laboratory

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List of Abbreviations, Acronyms, and Initialisms

CDD	Construction and demolition debris
ICI	Industrial, commercial and institutional
lb/yd ³	Pounds per cubic yard
LCD	Land clearing debris
MFA	Materials flow analysis
MRF	Material recovery facility
MSW	Municipal solid waste
NRML	National Risk Management Research Laboratory
NAPA	National Asphalt Pavement Association
RAP	Reclaimed asphalt pavement
Ton	Short ton
T _{CD}	The total amount of CDD disposed of in the US in a given year (tons)
T _{TCD}	The total amount of dedicated CDD loads disposed of in CDD and non-CDD landfills in the US (in tons)
T _{CDD,MSW}	Total amount of CDD in commingled loads disposed of in MSW landfills in the US (tons)
US	United States
US EPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1. Executive Summary

Construction and demolition debris (CDD), a materials stream dominated by components such as concrete, asphalt, wood, drywall and metal, represents a focal point of many communities working toward increasing solid waste recycling and promoting sustainable materials management. Reliable and routine statistics on the generation, composition, and disposition of CDD are needed to better target regulatory and policy initiatives designed to meet these goals, and to track progress over time. Previous estimates of CDD in the US have focused on building-related debris by using statistics on construction sector activity, but this approach does not incorporate the growing amount of data regarding measured CDD from processing and disposal facilities, and does not address CDD from sources other than buildings. The work presented in this report was motivated by the need to develop a standardized methodology for estimating and tracking CDD generation, composition and disposition using readily available data reported by state regulatory agencies and applicable trade organizations.

This report, *Methodology to Estimate the Quantity, Composition and Management of Construction and Demolition Debris in the US*, was developed to expand access to data on CDD in the US and to support research on CDD and sustainable materials management. Since past US EPA CDD estimates have been limited to building-related CDD, a goal in the development of this methodology was to use data originating from CDD facilities and contractors to better capture the current picture of total CDD management, including materials from roads, bridges and infrastructure.

The methodology incorporates state-reported, facility-measured CDD diversion and disposal data. A thorough search of US state regulations and on-line reported data regarding CDD was conducted, and states providing strong data sources were identified. As data were not available for every state, CDD disposal and diversion amounts for states with appropriate data were extrapolated to the rest of the US. Building permit data provide a strong correlation with reported CDD disposal amounts and are thus proposed as a means of extrapolating the reported data to the entire US. CDD diversion data for those states reporting such information are extrapolated to the rest of the country by relating state CDD diversion amounts to the number of CDD processing facilities present.

Some CDD is not managed through state-permitted waste management facilities, and thus generation data for these sources of CDD are potentially not included in state-reported data. Examples include concrete crushing plants targeting large sources of concrete debris (such as large building demolition projects and roadway construction and maintenance), asphalt pavement contractors, and land clearing debris (LCD) operations. Sources of additional data for these debris sources were sought. The National Asphalt Pavement Association (NAPA) provides robust data for reclaimed asphalt pavement (RAP) based on a routine nationwide survey of asphalt mix producers and this data source was included in the methodology for CDD estimation. Reliable information regarding concrete processed at crushing plants and LCD operations was not available. The proposed methodology thus uses state-reported data for CDD disposal (in both CDD and MSW landfills) and diversion, extrapolates these data to the rest of the country, and adds the amount of RAP from the NAPA estimate.

The proposed methodology, when demonstrated for 2011, results in an estimated generation of 233 million tons of CDD. The following steps outline the pertinent components of this analysis.

- CDD disposal amounts were estimated using the following steps:
 - States which track CDD disposal data at all permitted disposal facilities and that accounted for imports and exports to and from the state were identified. These data were correlated with building permit information compiled by the

United States Census Bureau so that extrapolations could be made to states where insufficient data were available.

- Reported CDD disposal amounts from states with available data were summed.
 - CDD disposal quantities from states with insufficient data were estimated by using the previously-discussed building permit correlations.
 - To account for CDD that is disposed of commingled with MSW, 12 region-wide waste composition studies were reviewed. The weighted average percent of CDD disposed of in commingled loads with MSW was estimated as 10.5% (weight-based).
 - The total amount of CDD disposed of in MSW landfills in commingled CDD-MSW loads was estimated as the product of the nationwide MSW disposal quantity reported in the Biocycle State of Garbage survey and the numeric value representing the weighted average fraction of CDD in MSW (0.105).
 - The total CDD disposal amount was estimated as the sum of: i) disposal amounts in all the permitted disposal facilities as reported by states; ii) disposal amounts extrapolated to states that do not report amounts under i); and iii) calculated amounts of CDD commingled with disposed MSW.
- The disposal estimate for the year 2011 was 99 million tons. The portion of the disposal estimate derived strictly from the CDD amounts reported by states was 27% . When considering the quantity of CDD in CDD-MSW commingled loads disposed of in MSW landfills (the MSW disposal figure from the State of Garbage survey is based on reported amounts), the portion of the disposal estimate derived from measured (not extrapolated) data is 56% .
 - Diverted CDD amounts were estimated using the following steps:
 - Summing available state-reported CDD diversion data – information from 12 states was available.
 - Estimating the number of CDD processing facilities in each state as provided by the states and (as necessary) supplementing any data gaps with additional information from CDD industry sources.
 - Dividing the total diverted CDD amount by the total number of CDD processing facilities in the 12 states to establish a per-facility diversion amount.
 - Using the per-facility processing amount and multiplying this figure by the total number of CDD processing facilities located in the 38 states where CDD diversion data were not available.
 - Summing the state-reported and extrapolated CDD diversion quantities.
 - The CDD diversion estimate for the year 2011 was 55 million tons. Approximately 31% of this estimate consisted of state-reported data. This quantity is independent of the reclaimed asphalt pavement amount recycled by asphalt mix producers, which is described below.
 - A survey conducted by the National Asphalt Pavement Association (which surveyed hot mix asphalt plants that use reclaimed asphalt pavement RAP) was identified that reported the total amount of RAP recycled/used. The reported quantity of RAP recycled by hot mix asphalt plants in 2011 was 73 million tons.

It is to be expected that the CDD generation estimate (222 million tons) based on the proposed methodology would be lower than the estimate of 680-860 million tons (in 2002) based on a material flow analysis (MFA) (presented by Cochran and Townsend for 2002 (2010)), which assumes that 100% of the materials used for buildings as well as infrastructure construction would be managed as CDD at the end of its service life; the service life assumption significantly impacts the MFA methodology estimate. It is also to be expected that due to the inclusion of some portion of CDD generated from infrastructure activities (e.g., road and bridge construction and demolition), the estimate based on the proposed methodology would be greater than the generation estimates based on the methodology proposed to account for building-related CDD (170 million tons in 2003) only (presented by US EPA 1998, 2009).

1. Introduction

1.1 Background on CDD Materials Management and Previous Estimates of CDD Material Quantities in the US

Construction and demolition debris (CDD) consists of the materials generated during the construction, renovation, and demolition of buildings, roads, and bridges. The components contained within CDD vary depending on the activity type and structure. Broadly, the CDD stream is comprised of concrete, wood, metals, asphalt, drywall, masonry products, and land-clearing debris (LCD). CDD represents a substantial fraction of the overall materials and discards generated as a result of human activities, at amounts similar to the magnitude of municipal solid waste (MSW). CDD may be recovered for direct reuse, utilized in other beneficial ways, or disposed of in landfills (and to a lesser extent in combustion facilities). Building-related CDD recycling and reuse practices have evolved over the past decade as a result of the growing recognition of the importance of CDD in sustainable materials management. Additional motivation has resulted from initiatives such as green building rating system requirements and credits, local government CDD ordinances, and state and local building code requirements.

Key elements in the successful planning and assessment of any sustainable materials management system include an examination of the quantity and composition of the materials generated, and an estimate of how these materials are ultimately handled (e.g., disposed versus recycled). Such information is critical for large quantity material streams such as MSW and CDD. Generation and composition data have been tracked back to 1960 and published for MSW for over 30 years, and have proven to be a valuable tool to government organizations, industry, and the general public to benchmark progress and set goals, policy and investments to support material management decisions and increase sustainability. Historically, much less attention has been paid to CDD relative to MSW, and data on CDD generation and management have not been readily available. The need for better collection, compilation and tracking of such data pertaining to CDD provides the underlying motivation for the work presented in this report.

The annual estimate of the US MSW generation and composition conducted by the US EPA utilizes a materials flow analysis (MFA) approach, where statistics on raw product manufacture are coupled with estimates of product lifespan to estimate discard rates; this is combined with regional-reported data on yard trash, food waste, and material disposition to complete the analysis. When the US EPA estimated the US-wide CDD generation for 1996, instead of using the MFA, it used the data from the US Census Bureau and similar data sources in conjunction with waste generation estimates for individual construction, renovation, and demolition activities to estimate total CDD generation for each different activity at the national level. The US EPA applied a similar methodology to estimate CDD generation for 2003.

One of the cited deficiencies with the 1996 and 2003 estimates was that it only included CDD from building-related activity (construction, renovation, and demolition). A large amount of CDD occurs as a result of activity related to the construction, repair and demolition of roads, bridges, and other structures. Cochran and Townsend (2010) developed a US CDD generation estimate for 2002 following a materials flow analysis (MFA) approach. The MFA approach accounted for the consumption of construction materials in the US over the past century, assumed waste production factors associated with construction materials purchasing, and incorporated assumed material service life to calculate the mass of CDD debris generated in the US. The results of all three analyses are shown in **Figure 1-1**. The 1996 and 2003 estimates were 136 million and 170 million short tons, respectively, while the 2002 MFA estimate ranged from 680 million to 860 million tons (depending on product life-span assumptions); building-related CDD in this estimate ranged from 121 million to 242 million tons; these CDD generation estimates are presented in Figure 1-1.

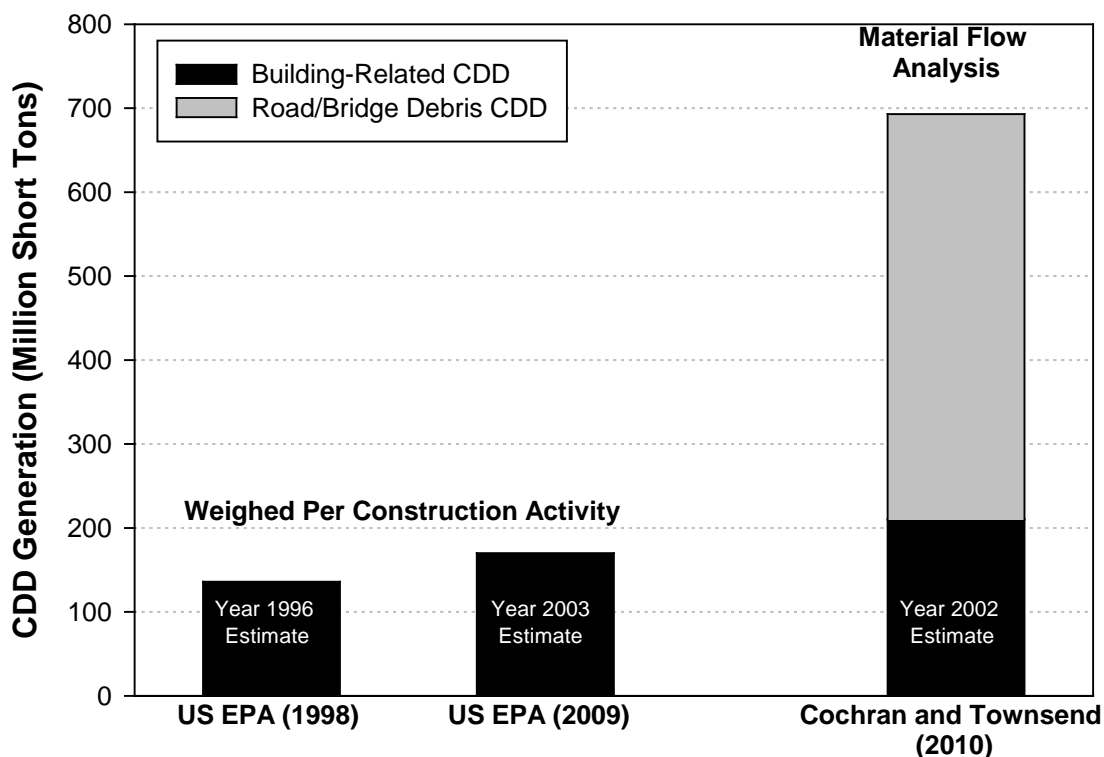


Figure 1-1. Previously-Reported Annual Estimates of CDD Generation in the US

Both methodologies have limitations. The methodology used in the US EPA estimates for 1996 and 2003 relies on statistics that are not available on an annual basis and has not incorporated techniques to account for non-building related CDD. The MFA methodology rests on the assumptions of product lifespans (which range over many decades), and thus the CDD estimate is not sensitive to yearly changes in spending on construction and demolition projects. Neither approach accounts for certain components of CDD, including land clearing debris. In addition, these approaches do not predict the final disposition of CDD or incorporate any facility- or region-reported CDD data.

Historically, most state solid waste regulations did not require CDD disposal or diversion quantities to be tracked. However, in recent years, the number of US states defining and requiring the accounting of CDD management has grown. This shift represents an opportunity to create an estimate of CDD generation and management that incorporates actual CDD quantities measured at operating facilities. Furthermore, efforts by numerous states have led to extensive studies of CDD management at disposal and processing facilities, and the analysis of these large data sets allows for a broader evaluation of the composition of CDD managed at these facilities.

The primary objective of this work was to develop a methodology that estimates CDD disposal and diversion by utilizing state-reported, facility-measured data. This approach is described herein as a “bottom-up” approach in that the data are based on that which is actually managed by CDD processors and disposal facility operators. In this study, the quantities of CDD that are reused via online networks, used material thrift stores, and other pathways such as donations, were not quantified.

1.2 Scope and Objectives

The scope of this project involves the development of a methodology that could be used to estimate the national generation rate of CDD using state, facility and industry-reported data as a foundation. Integrated into this approach is a methodology for estimating CDD composition associated with the generation estimate, as well as an estimate of CDD disposition (e.g., landfilled, diverted from disposal). The bottom-up approach outlined here incorporates three different types of information: data reported by facilities to state regulatory agencies and reported by the state regulatory agency, published summaries and survey results of materials handlers or processors, and published material composition or characterization reports that present weight-based measurements of CDD. The categories of sources used in this analysis and the development of this report included:

- Publicly-available information from state-level environmental regulatory agencies, mostly those that have domain over waste and materials management. This information included, but was not limited to, state-wide solid waste management reports, waste characterization studies, raw data files related to waste generation or composition, solid waste regulations (including recycling), and state guidance documents. “Publicly available” generally means that data were sourced from environmental regulatory agency websites. **No surveys were conducted as part of data gathering in this project.**
- Reports, data, and other information from federal and state government agencies
- Reports and information from relevant trade organizations

The focus of this analysis was not to provide a single estimated quantity of CDD generation in the US, but rather to provide a methodology that can be used to make such estimates. The data and estimates for 2011 were used as examples throughout this report as needed to explain the development process and the methodology itself; the state data for 2008 through 2011 were used, as available, for regression analyses for selecting an appropriate surrogate parameter to extrapolate the regional data to a US-wide CDD disposal estimate.

1.3 Report Organization

This report was developed to facilitate the reader’s understanding of the different components of the methodology. The sections of the report are as follows:

- Section 1 presents an overview, scope, and outline of the report
- Section 2 presents a description of the components of the CDD generation and management estimation methodology
- Section 3 presents the methodology to estimate the quantity of CDD disposed of at registered and permitted disposal facilities
- Section 4 presents the methodology to estimate the quantity of CDD diverted from disposal at registered and permitted CDD processing facilities
- Section 5 presents the approach to estimate the quantity of reclaimed asphalt pavement (RAP) recycled
- Section 6 presents an estimate of the CDD composition at CDD disposal facilities and at CDD processing facilities

- Section 7 discusses a variety of notes and limitations associated with the developed methodology
- Section 8 presents the references used in the report. Note that additional references are provided throughout the appendices as well.

Supplemental and detailed information was gathered and is presented in a series of appendices:

- Appendix A presents a detailed discussion of each state's rules related to CDD, including a listing of resources such as links to state rules and other relevant information
- Appendix B presents details on the methodology related to the CDD disposal estimate at registered and permitted facilities in the US
- Appendix C presents background on the methodology related to the CDD diversion estimate at registered and permitted facilities in the US
- Appendix D presents a discussion on an alternative RAP estimate methodology
- Appendix E presents details on the CDD characterization evaluation for disposal facilities
- Appendix F presents a checklist for data collection to be used in future CDD generation estimates

2. Components of the CDD Generation Estimate Methodology

As described in Section 1, past US EPA CDD estimates have only included building-related CDD. In the methodology described within this report, efforts were made to locate data sources that would include not only building-related CDD, but also road, bridge and infrastructure CDD, as well as land-clearing debris. Data specifically on disaster debris (which may be similar in nature to CDD) was not targeted.

A necessary step in the development of the CDD estimation methodology was an examination of the current regulatory definition(s) of CDD, the associated major CDD components and sources, and requirements for tracking and reporting CDD data. No definition or set of regulations specific to CDD exists at the US federal level; these materials are defined and regulated at the state level. While many common threads exist when comparing different state statutes and regulations, quite a few contrasts – some more significant than others – also exist. Some states require that facilities or municipalities track and report data on the amount and disposition of CDD and/or its major components. State rules, regulations, and guidance were thus reviewed to provide the proper context when examining state data and reports. A detailed presentation of state-by-state regulations and observations related to these rules is presented in **Appendix A**.

A summary of key observations from the state regulatory and document review is provided below:

- CDD definitions vary by state. Regulations can take a broad form (e.g., by specifying the activities considered to produce CDD) or a specific form (e.g., enumerating specific material components considered to be CDD).
- As a result of varying definitions of CDD, some materials are defined as CDD in some states, but not in others. In this analysis, the broadest interpretation of CDD was taken. For example, if two states' regulations were compared and one considered land-clearing debris (LCD) to fall within the CDD definition and the other state did not, the US EPA considered LCD in the analysis.
- State regulations and associated CDD definitions typically form the basis for which materials are counted and often dictate whether or not facilities are required to report the quantity of CDD disposed or diverted. Frequently, it was observed that if a specific material type was exempt from being defined as CDD (or as a solid waste), then that state did not have a tracking and reporting requirement for facilities handling that material.
- Even if a material type is considered to be CDD, there may not be a requirement in place to track and report associated data.
- It was found that even in cases where tracking and reporting of CDD amounts received at a given permitted or registered facility was required by state law, the data were not always readily available. As discussed in **Section 1**, the scope of work in this project did not include surveying individual states to gather all available data. Rather, the scope included gathering readily available data from states. The data were available from the state's environmental regulatory agency, typically through the agency's website.
- Procedures regarding the handling of data or the availability of state data are not static, so observations described in this report are current as of the development date of this report. More states may make data available in the future. It is expected that as analytical tools and tracking become more prevalent at the state level and better data collection and reporting is instituted, a greater portion of the CDD estimate using the outlined CDD estimation methodology will be derived strictly from the reported amounts.

The universe of potential data that might be tracked with respect to CDD generation and disposition includes materials managed by several different types of facilities. CDD is typically encountered in either a form where it is mixed with other CDD components (i.e., mixed-CDD from whole building demolition) or where it exists as predominantly one primary component (e.g., concrete from large concrete buildings or from road or bridge projects). Mixed CDD will most often be managed at either a mixed CDD processing facility, a CDD landfill, or at a non-CDD landfill (e.g., MSW landfill). These facilities fall within the jurisdiction of state regulatory agencies responsible for solid waste management. When CDD is predominantly generated as a single material, it might be managed outside of typical solid waste management infrastructure. The two most common examples of such facilities are concrete crushing facilities that only accept concrete (or similar materials) and asphalt processing and recycling operations. These types of facilities would not normally be covered by a solid waste facility permit, and thus material quantities managed at these facilities may not be included as part of state-reported data.

The methodology presented in this report involves gathering data from major CDD facility types, estimating the total CDD managed by each facility type, and summing the estimates. Details of the methodology are provided in the subsequent sections of this report, but a conceptual figure, **Figure 2-1**, provides an overview of the different elements of the CDD generation and management estimate.

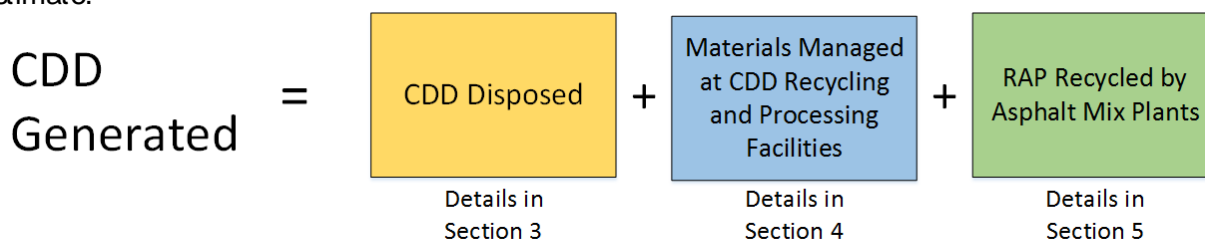


Figure 2-1. Components of the CDD Generation and Management Methodology with Corresponding Report Section Numbers

The three components illustrated in **Figure 2-1** are disposed CDD (at CDD or MSW landfills), CDD diverted from disposal by processing and recycling facilities, and reclaimed asphalt pavement (RAP). As will be discussed in **Section 5**, RAP was handled separately because this material is often recycled at facilities that are not required to have a solid waste permit. Two other major components of the CDD stream (segregated concrete and LCD) were originally considered for separate estimation steps similar to RAP. These materials may in some cases be recycled or disposed at permitted CDD facilities, but often they are processed and recycled by non-permitted facilities that are not required to report material quantity data. Upon review, not enough facility-based or facility-reported data were available to create an estimate methodology for these materials that was consistent with the other components presented in this analysis.

Section 3 provides the detailed methodology on estimating CDD disposal using state-reported CDD data, and **Section 4** does the same for CDD diversion. Both of these estimates will include some amount of segregated concrete and LCD, but it is acknowledged that some fraction of these CDD streams will escape the generation estimate as currently outlined.

3. Methodology to Estimate CDD Materials Disposal at Permitted or Registered Disposal Facilities in the US

3.1 Methodology Components and Overview

As discussed in **Section 2**, CDD may be disposed of in various types of facilities. Depending on the nature and scale of the project, CDD may be stored in a dedicated container or may be discarded with MSW in a trash can or container at the point of generation. The dedicated CDD loads can be transported to several types of facilities permitted to accept CDD, whereas the CDD commingled with MSW is typically transported to the facilities that are permitted to accept MSW. The analysis of state data showed that a number of states (and by extension, facilities) track the amounts of CDD disposed of in CDD landfills and where pertinent, amounts of dedicated CDD loads disposed of in non-CDD facilities; these data are reflected in the states' solid waste management reports. However, as discussed above, the dedicated CDD loads comprise only a portion of CDD disposed of in an MSW landfill; the other portion includes CDD that is commingled with MSW – referred herein to as commingled loads. The methodology to estimate the total quantity of CDD disposed at permitted or registered facilities in the US includes two parts:

- Dedicated loads of CDD disposed of at CDD and non-CDD disposal facilities; .
- CDD commingled with MSW disposed of at MSW landfills

Figure 3-1 provides a definition sketch to illustrate how the methodology approaches estimating CDD disposal. Some states provide sufficiently reliable reported data which can be used to quantify dedicated CDD load disposal for that specific state while others do not.

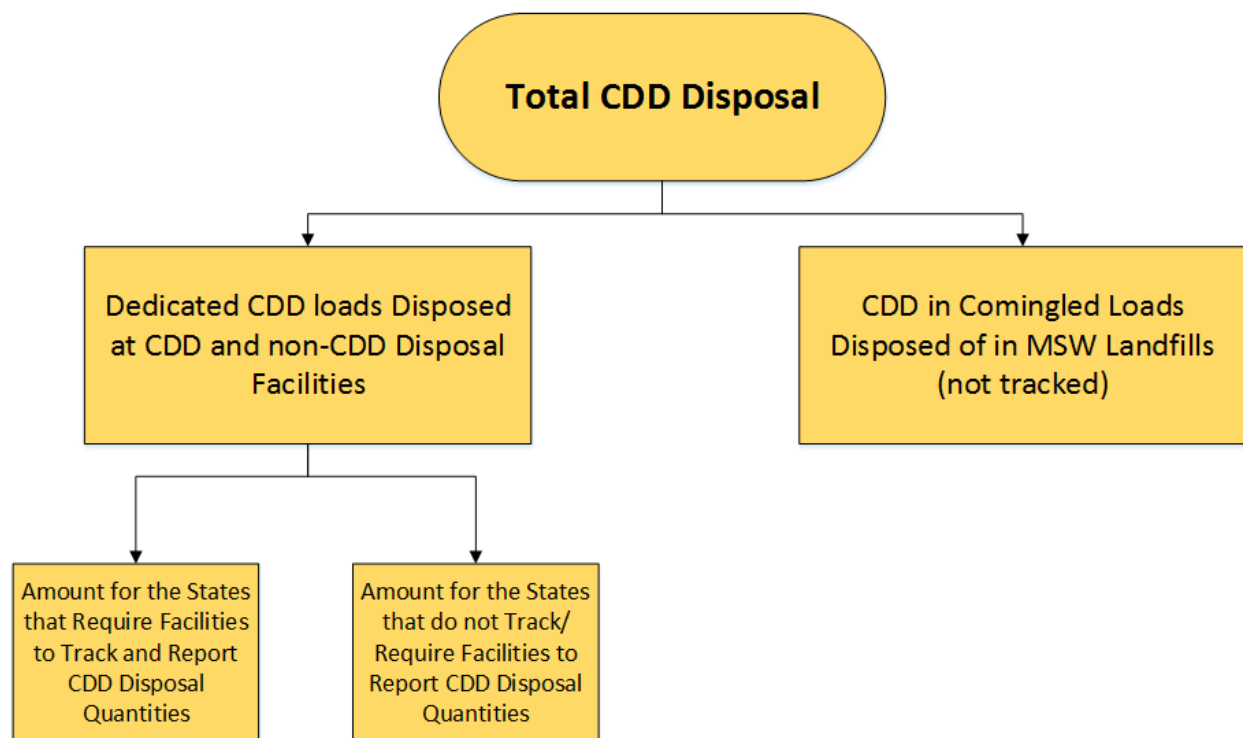


Figure 3-1. Definition Sketch Showing Individual Elements of the Methodology to Estimate Disposal

of CDD at Registered or Permitted Facilities

As the left half of **Figure 3-1** shows, dedicated CDD loads disposed of at either CDD disposal facilities or non-CDD disposal facilities may be accounted for in two ways: directly (in states where disposal data are available) and indirectly (by using a calculated value to estimate CDD not tracked or not made available by states). The approaches used to account for the “indirect” fraction are described in Section 3.2.

The right half of **Figure 3-1** relates to commingled CDD-MSW loads disposed of at facilities that accept MSW. With the exception of Washington, which specifically estimates the fraction of CDD disposed of in commingled loads, states do not appear to account for non-dedicated CDD load disposal. The approach used to estimate the quantity of CDD disposed in commingled loads is described in Section 3.3.

Total CDD disposal is the sum of CDD in dedicated loads disposed of in CDD and non-CDD landfills and the CDD in commingled CDD-MSW loads disposed of in MSW landfills, **Equation 3-0**.

$$T_{CD} = T_{TCD} + T_{CDD,MSW} \quad \text{(Equation 3-0)}$$

Where,

T_{CD} = The total amount of CDD disposed of in the US in a given year (tons)

T_{TCD} = The total amount of dedicated CDD loads disposed of in CDD and non-CDD landfills in the US (in tons)

$T_{CDD,MSW}$ = Total amount of CDD in commingled loads disposed of in MSW landfills in the US (tons).

3.2 Estimating the Disposal of Dedicated CDD Loads in CDD and non-CDD Landfills

In addition to varied reporting requirements, states analyze and organize received waste disposal quantities in a variety of ways. Reporting requirements and the layout and transparency of the reported CDD disposal data were reviewed by the US EPA. Documents reviewed included state regulations and the waste management and/or quantity reports themselves.

The US EPA developed a data quality categorization system to organize available state-reported disposal quantity data. The term “data quality” is not a reference to whether or not data were believed to be accurate or whether the data were considered “good,” “fair,” or “poor.” Rather, developing the data categories was needed to help identify states that conveyed data at a level of detail that would allow for effective projections or extrapolations to the other states that do not collect relatively complete CDD disposal data.

Note that the lack of availability of data as reported in this document does not mean that data are not available at all. In this report, state CDD disposal data was categorized as a “0” if:

- CDD disposal was not tracked at all registered and permitted disposal facilities which may accept CDD, or
- CDD disposal quantities were not readily available, regardless of whether that state appears to be tracking CDD disposal at all registered and permitted disposal facilities which may accept CDD, or

- CDD disposal data does not appear to be tracked by the state or by disposal facilities in the state.

In cases where data were available, the state was given a data category based primarily on the resolution and transparency of the data – the higher the data resolution and transparency, the higher the data category. **Table 3-1** shows the data category values, describes the reasoning behind them, and lists states that were assigned the corresponding data category based on the most recent year where common data sets were available, 2011.

Table 3-1. Presentation of Data Categories, Description, and State Data that Fall into Each Category as of 2011

Data Category	Brief Description	States
3	It appears that all CDD disposal data are tracked and available for every type of disposal facility that may accept CDD (not including LCD). CDD import and export data are also tracked and are available.	Maine, Massachusetts, Washington, Florida
2	It appears that all CDD disposal data are tracked and available for every type of disposal facility that may accept CDD (not including LCD). CDD import and export data are also being tracked and are available. However, some portion of the CDD imports or exports may not be tracked/available (e.g., imported CDD disposal at MSW landfills) but other data (e.g., total imports or exports of solid waste) suggest that the estimated amounts are within $\pm 15\%$ of the actual state-generated CDD disposal amount.	Kansas, Maryland, South Carolina
1	It appears that all CDD disposal data are tracked and are available for every type of disposal facility that may accept CDD (not including LCD). However, either some portion of CDD imports and exports may not be tracked/available (e.g., imported CDD disposal at MSW landfills) or other data (e.g., total imports or export of solid waste) suggest that the estimated amounts are outside of $\pm 15\%$ of the actual state-generated CDD amount.	Texas, Virginia, Nevada, Michigan
0	CDD disposal data are not readily available, is not separately tracked from other waste types, or is not tracked at all.	The remaining 39 states

To address data gaps in states with data category of 0, options for extrapolating the available data were examined. The extrapolation procedure involved selecting a surrogate parameter that related CDD disposal to a widely available statistic. The relationship between the surrogate parameter and CDD disposal in the states with category 2 and 3 ratings was determined, and this was then applied to the states with 0 data category. **Appendix B** details a series of analyses that were conducted as part of the surrogate parameter analysis. Upon examining 18 different surrogate parameters, the US EPA found that the number of building permits issued (taken from the US Census Building Permit Survey, which is published monthly and annually) provided the most effective surrogate of the parameters analyzed. Specifically, an analysis of CDD disposal data (for states ranked 2 and 3), and the number of building permits issued in the corresponding year between 2008 and 2011, resulted in a correlation coefficient (r^2) ranging from 0.82 to 0.93.

The selection of building permit data as a surrogate for CDD disposal does not imply that the construction of buildings is the primary source of CDD; most CDD results from demolition activities. But the results of the analysis presented in Appendix B do suggest that building permit data do provide a good indicator of CDD disposal amounts. The building permit information that the US Census collects is reported annually, but does not cover the entire US; it corresponds to “permit-issuing locations” that are reflected in the building permit survey which correspond to 95% of the US population.

With the number of building permits selected as a surrogate parameter to extrapolate data for states where data are unavailable, a “unit disposal rate” was established to correspond to the amount of CDD disposed as a function of building permits issued. The approach used for this calculation is presented in **Equation 3-1**.

For each state with data quality category of 2 or 3, the relationship between the total reported CDD disposal quantity and the number of building permits can be established as shown in **Equation 3-1**. It should be noted CDD disposal amounts for the states with the data category of 2 or 3 include dedicated CDD loads disposed of in MSW landfills.

$$q_{uD} = \frac{\sum_j^I T_{CDD_j}}{\sum_j^I BP_j} \quad (\text{Equation 3-1})$$

Where,

q_{uD} = Unit disposal tonnage amount per building permit, for the calculation year of interest.

T_{CDD_j} = Total reported CDD disposal quantity (in CDD landfills and as dedicated CDD-loads in non-CDD landfills) of the j^{th} state that has a CDD disposal data category of 2 or 3 (tons for the calculation year of interest).

BP_j = The number of building permits issued by the j^{th} state that has a CDD disposal data category of 2 or 3 (permits for the calculation year of interest).

I = Total number of states with a CDD disposal data category of 2 or 3.

Based on **Equation 3-1**, an equation can be established that allows for the computation of the quantity of CDD disposed of in states where data are not available, as shown in **Equation 3-2**:

$$T_{NRD} = q_{uD} \times \sum_k^m BP_k \quad (\text{Equation 3-2})$$

Where,

T_{NRD} = Amount of CDD disposed of in CDD landfills and as CDD-dedicated loads in non-CDD landfills in the states with the data category of 0 (tons for the calculation year of interest).

BP_k = Total number of building permits issued by k^{th} state with data category of 0, in the given year of interest.

m = Total number of states where CDD disposal data are categorized as 0.

$$T_{TCD} = \sum T_{CDD,i} + T_{NRD} \quad (\text{Equation 3-3})$$

T_{TCD} = The total amount of CDD disposed of in CDD landfills and as CDD-dedicated loads in non-CDD landfills in the US (tons for the calculation year of interest)

$T_{CDD,i}$ = Total CDD disposal quantity (in CDD landfills and as CDD-dedicated loads in non-CDD landfills) of the i^{th} state that has a CDD disposal data category of 1, 2 or 3 (tons for the calculation year of interest).

In future estimates, the re-establishment of the states upon which the correlation is based should not require annual updates, but updating this information every three years may allow for additional states to be included in the basis of the correlation, assuming additional states begin collecting the requisite data or make collected data more readily available.

3.3 Methodology to Estimate CDD Disposal in Commingled CDD-MSW Loads in MSW Landfills

The data reported by facilities to the state would be expected to readily capture dedicated loads of CDD, but it is anticipated that reporting the CDD portion in commingled CDD-MSW loads would be difficult (e.g., if a load arrives with mostly MSW and some CDD, the load would likely be coded as all MSW rather than part MSW and part CDD because the commingled load would need to meet the more stringent landfill criteria that apply to the disposal of MSW). This section presents a methodology to estimate the amount of CDD that is brought to MSW landfills as commingled CDD-MSW loads.

Several waste characterization studies have been published that estimate of the percentage of CDD arriving as commingled loads at MSW landfills – these studies are summarized in **Table 3-2**.

Table 3-2. Summary of Reported CDD Fraction in Disposed MSW Based on Large-Scale MSW Characterization Studies

State	Source	Year	Amount of MSW Represented in the Study (tons)	Reported CDD Fraction (weight %)	Description of Material Evaluated in Study
California	California 2008 Statewide Waste Characterization Study, <i>California Integrated Waste Management Board, Cascadia Consulting Group</i>	2008	11,935,173	11.20	Residential MSW Component
Connecticut	Connecticut State-wide Solid Waste Composition and Characterization Study - Final Report, <i>DSM Environmental Services, Cascadia</i>	2010	2,379,687	14.10	MSW

State	Source	Year	Amount of MSW Represented in the Study (tons)	Reported CDD Fraction (weight %)	Description of Material Evaluated in Study
	<i>Consulting Group, MidAtlantic Solid Waste Consultants</i>				
Delaware	Delaware Solid Waste Authority Statewide Waste Characterization Study, <i>Cascadia Consulting Group, DSM Environmental Services, MSW Consultants</i>	2007	429,450	11.55	Residential and ICI ¹ MSW Components
Georgia	Georgia Statewide Waste Characterization Study, <i>R.W. Beck</i>	2005	6,685,002	6.00	Residential and ICI MSW Components
Illinois	Illinois Commodity/Waste Generation and Characterization Study, <i>Illinois DCEO, CDM</i>	2009	13,697,700	18.00	MSW
Indiana	Municipal Solid Waste Characterization Study for Indiana, <i>Purdue University Calumet</i>	2012	8,600,518	6.01	MSW
Iowa	2011 Iowa Statewide Waste Characterization Study, <i>MSW Consultants</i>	2011		13.50	Mixed MSW Component
Maine	2011 Maine Residential Waste Characterization Study, <i>The University of Maine</i>	2011		3.35	MSW
Tennessee	2008 Tennessee Waste Characterization Study, <i>Tennessee State University Department of Civil and Environmental Engineering</i>	2008	6,683,111	4.87	MSW
Vermont	Vermont Waste Composition Study, <i>DSM Environmental Services</i>	2002		4.60	Residential Combined MSW Components

¹ i.e., industrial, commercial and institutional

State	Source	Year	Amount of MSW Represented in the Study (tons)	Reported CDD Fraction (weight %)	Description of Material Evaluated in Study
Washington	2009 Washington Statewide Waste Characterization Study, <i>Washington State Department of Ecology, Cascadia Consulting Group</i>	2009	1,826,521	3.80	Residential and Self Haul "Other" MSW Components
Wisconsin	2009 Wisconsin State-Wide Waste Characterization Study, <i>Wisconsin Department of Natural Resources, MSW Consultants</i>	2010	1,440,491	10.10	Residential and ICI MSW Components

As shown in **Table 3-2**, the weighted average percentage of CDD in MSW for 12 large-scale waste characterization studies was 10.5%. This portion of the methodology estimates CDD in commingled CDD-MSW loads that goes unreported by disposal facilities to the state.

To develop the estimate of CDD disposed of in MSW landfills as commingled loads, the fraction of CDD in MSW based on the waste characterization studies (**Table 3-2**) must be applied to the total amount of MSW disposed for the year of interest. The US EPA identified two potential sources to use for the MSW disposal quantity:

- The MSW Facts and Figures report published by the US EPA
- The State of Garbage in America survey published by *Biocycle* magazine and the Earth Engineering Center at Columbia University

To maintain consistency with other steps of the methodology, the State of Garbage survey (while not published as frequently as the US EPA data) was selected. Specifically, the data in the State of Garbage survey derive from the measurements collected and reported by facilities, while the US EPA report is based on an MFA approach. The survey is published approximately every 3 to 4 years and the most recent report was published in 2010 corresponding to data collected in the year 2008. The most recent published survey results represent the 17th time the survey had been conducted, though it is not clear whether the survey will continue. As an alternative, the data generated as part of the State Data Measurement Sharing Program, an effort that is being deployed in 2014 by the US EPA to facilitate data gathering from states, may be used.

The methodology used by the most recent survey involves asking representatives at the state level to answer questions about reported amounts of MSW combusted, landfilled, composted, and recycled. The most recent survey reports results from several responsive states, but data for many states were interpolated or gathered outside of the survey itself. Because of the variable nature of data that made up the reported survey results (e.g., in van Haaren et al. (2010)), the methodology to incorporate the survey results will rely on the national-level estimate rather than applying a CDD composition factor to individual state data reported in the State of Garbage survey.

Van Haaren et al. (2010) reported that “non-MSW” materials are filtered out of the survey results so that only MSW is represented in the State of Garbage survey results. However, as described above, commingled loads of MSW and CDD likely are not counted separately, so applying the weighted average composition of CDD found in commingled MSW to the State of Garbage Survey MSW disposal quantity is considered appropriate. Thus, application of a CDD composition factor to the amount of MSW landfilled reported by van Haaren et al. (2010) and future State of Garbage surveys should not result in substantial double-counting of materials, provided the methods used in the survey in the future do not change from those reported in van Haaren et al. (2010).

Based on the rationale described above, the quantity of CDD disposed of with MSW (i.e., commingled) can be calculated as shown in **Equation 3-4**.

$$T_{CDD,MSW} = p_{cd} \times T_{MSW} \quad \text{(Equation 3-4)}$$

Where,

$T_{CDD,MSW}$ = Total amount of CDD commingled with MSW and disposed of in MSW landfills in the US (tons for the calculation year of interest).

T_{MSW} = Total amount of MSW disposed of in landfills in the US based on the value reported in the most recent State of Garbage in America survey (tons for the calculation year of interest).

p_{cd} = Numeric value representing the average percentage of materials (by weight) disposed of in MSW landfills consisting of CDD as CDD-MSW commingled loads = 0.105.

Since the State of Garbage survey is conducted once every 3 to 4 years, this portion of the estimate will be the same for each year until the new survey information is published. For example, an estimate of CDD disposal for the year 2011 and subsequent years would use the most recent State of Garbage survey MSW disposal quantity (269.8 million tons) multiplied by 0.105. However, if new survey data were published in 2014, the results for MSW disposal would be used for subsequent CDD disposal estimates. Since the survey results reflect data for two or three years prior to the date of publication, future estimates of CDD disposal would need to consider the year that the data were published in the State of Garbage survey and apply this quantity to the subsequent calculation year of interest.

In the event that the State of Garbage survey will no longer be updated, alternatives to the State of Garbage figure for MSW disposal could include the following:

- Gather MSW disposal data and create estimates based on facility data (preferable). The approach for this estimate would be similar to that described and developed in this project. Substantial effort would be required to create a defensible methodology, but extrapolations and streamlining of the estimate (similar to that done in this methodology for CDD disposal) could be used in the future after initial development of the methodology. This could be conducted as part of the US EPA State Measurement Sharing Program.
- US EPA’s estimate of MSW disposal based on the MSW: Facts and Figures report that is published every year (less preferable). Note that while this figure is updated annually, the figure is derived from a different methodology (MFA) and using this estimate would likely result in a contrast with CDD disposal estimates that used the State of Garbage Survey information.

3.4 Summary of Methodology to Estimate CDD Disposal Amounts

This section summarizes the methodology components used to estimate the quantity of US CDD disposal. As described in the previous sections, the method relies on actual state data to the extent practical and uses extrapolated data in cases where data are unavailable. Additionally, CDD disposal amounts that are not counted separately at the facility level are included in the estimate as well. **Figure 3-2** presents a summary sketch of the different components of the CDD disposal estimate methodology.

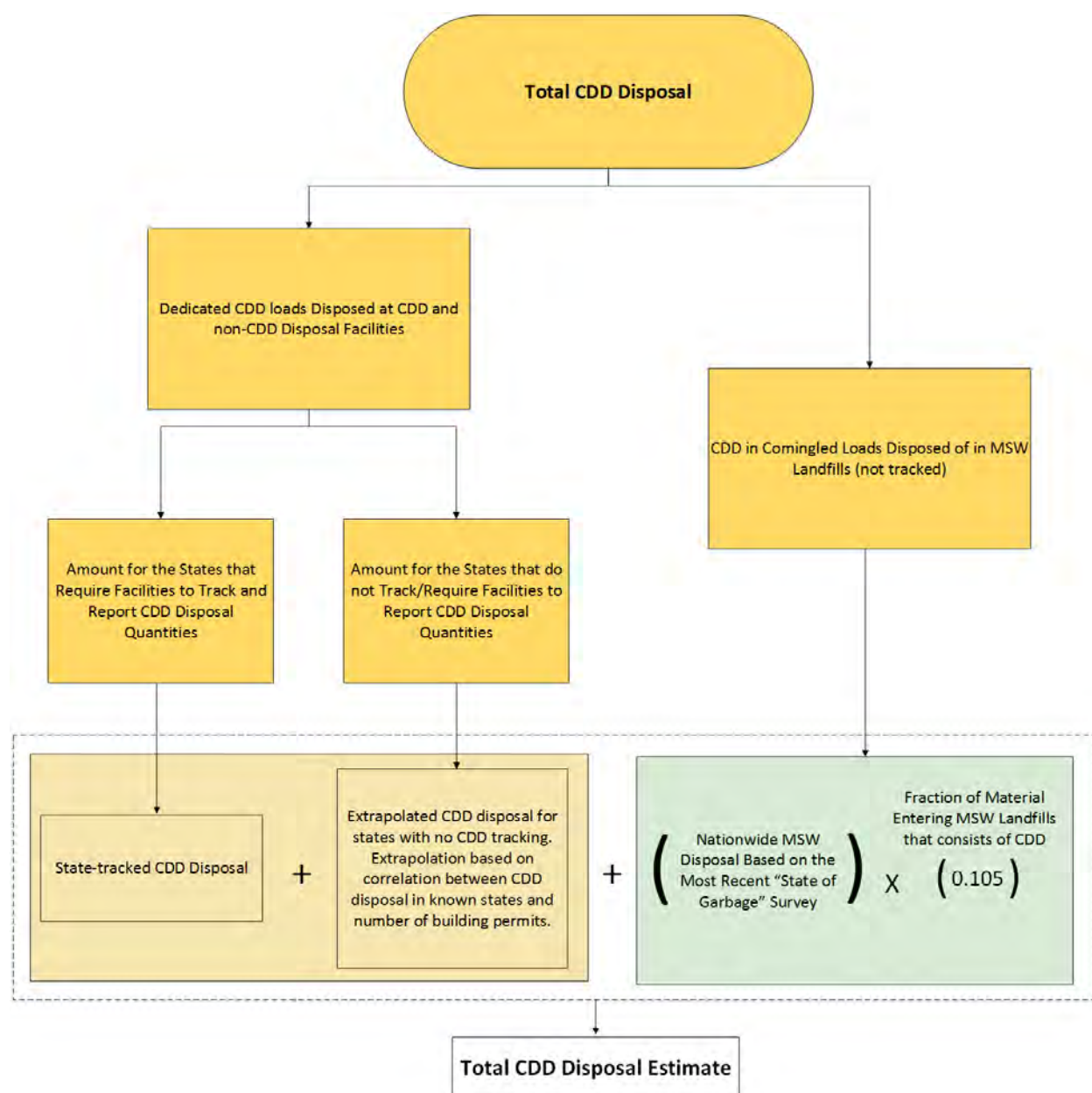


Figure 3-2. Depiction of Different Components of the CDD Disposal Methodology Including the Use of Known and Extrapolated Data

3.5 Comparison of Actual Versus Extrapolated CDD Materials Disposal Data

To demonstrate the relative weight of the CDD materials disposal estimate methodology using actual measured (i.e., state-reported) data compared to extrapolated data, the CDD disposal methodology was used to calculate disposal amounts for the calendar year 2011. Figure 3-3 presents the distribution of the measured and extrapolated CDD amount disposed as dedicated CDD loads and the amount of CDD disposed of at MSW landfills in CDD-MSW commingled loads. The actual measured amount accounts for approximately 27% of the overall CDD disposal estimate.

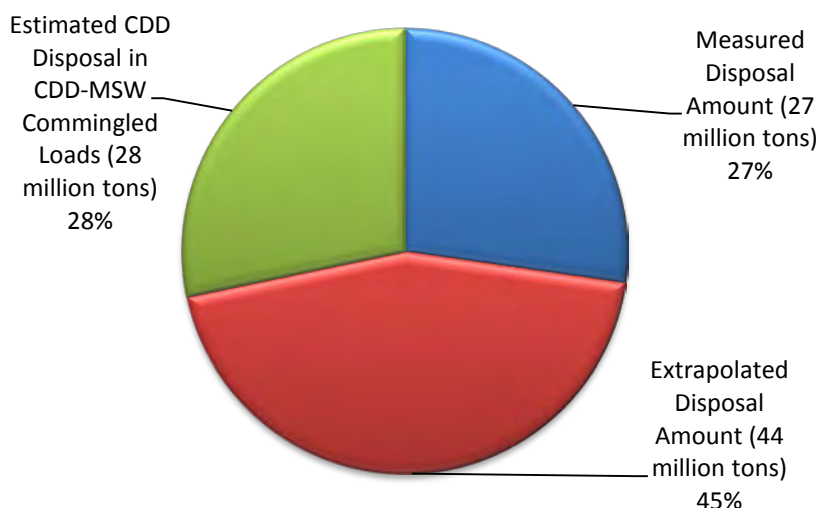


Figure 3-3. Comparison of Measured and Extrapolated Amounts for 2011 Developed using the Proposed Methodology

3.6 Limitations with the Methodology to Estimate CDD Disposal

The proposed methodology to estimate CDD disposal has the following limitations:

1. LCD disposal. As discussed earlier, LCD is not included in the definition of CDD in many state regulations. Moreover, many states, which consider LCD as CDD, may not require quantity reporting by some types of the facilities that are allowed to accept LCD. For example, the Florida Department of Environmental Protection does not require data reporting by Yard Trash Disposal facilities, which are allowed to accept LCD. The CDD disposal amounts estimated based on the proposed methodology include only a fraction of LCD disposed of in landfills, since some LCD is probably categorized and tracked as CDD when disposed at CDD and non-CDD landfills.
2. Accuracy of the measured data. As will be further discussed in Section 7, In contrast to MSW management facilities, which weigh the incoming materials, CDD management facilities generally record and track the amount of incoming materials in terms of visually-estimated volumes. The state environmental agencies often require quantities to be reported by weight (i.e., tons) rather than volume, since (for example) many state recycling goals are based on the weight of material rather than volume. A density is typically applied to convert the volumetric estimates to weight for reporting purposes. The density used for this conversion varies significantly across the states. For example, Florida uses a density of 484 lb/yd³, whereas New York uses a density of 1,500 lb/yd³. Visual estimation (which is subjective in nature) and

use of a single density value for all CDD loads (which can significantly vary in specific composition) introduces a source of error in the quantification of “measured” CDD. The inaccuracy associated with the CDD disposal quantification approach would be an inherent limitation of any bottom-up methodology and is not specific to the proposed methodology.

3. CDD disposal in commingled CDD-MSW loads. Although the proposed methodology uses an MSW amount estimated based on a periodic US-wide survey of MSW facilities, the CDD estimate uses CDD content of typical MSW loads based on a handful composition studies. Though several statewide composition studies were used to estimate CDD content of a typical MSW load, the proposed methodology does not account for future changes in MSW composition and its CDD content.
4. Slight overestimation. The data reported by Washington include CDD deposited of as commingled loads at MSW landfills - the state estimates the amount of CDD disposed of at its MSW landfills based on a statewide waste characterization study. No adjustment was made to the state-reported data to exclude the CDD included in the commingled CDD-MSW loads. The proposed methodology, therefore, slightly overestimates CDD disposal amounts. However, the inaccuracy associated with the use of CDD disposal amounts as reported is expected to be much smaller compared to those associated with the limitations discussed above.
5. Combustion. It should be noted that while most states do not, some states (e.g., Maryland) consider combustion as disposal. The combusted amounts are therefore reported with the disposal amounts. The disposal amount estimated based on the proposed methodology, therefore, includes a fraction of the CDD combusted.

4. Methodology to Estimate CDD Diversion at Permitted or Registered CDD Processing Facilities in the US

4.1 Overview

Due to a wide variation in the classification of the management of non-landfilled CDD (e.g., some states regard combustion as disposal whereas others regard it as recycling) among states and lack of readily available data for individual management methods (e.g., recycling, combustion, and composting) for several states, the US EPA developed a methodology for estimating CDD diversion from landfills (the “diversion”).² Quantifying the amount of CDD diversion requires collecting similar data as was collected in the methodology to estimate CDD disposal. The CDD diversion data did not correlate well with any of the identified indicators of construction activity (e.g., building permits, populations, median household income, number of active disposal/CDD processing facilities). Thus, a slightly different approach was used in the development of the methodology to estimate CDD diversion in the US.

A total of 12 states were found to report CDD diversion data, however, only 10 of these provided 2011 diversion data (i.e. Georgia and Nevada recently started reporting CDD diversion). The phrase “registered or permitted” is important because there are components of CDD (namely, RAP, concrete, and LCD) that are commonly managed at a facility or location that is not registered or permitted through a solid waste or environmental regulatory agency. This largely stems from the fact that these material types are often exempted from regulation as a solid waste or they meet the definition of “clean” debris, and therefore have relaxed reporting requirements when compared to mixed CDD. Ultimately, information and data that met the criteria established in this project (described in **Section 1**) were available for RAP only. Related discussions regarding concrete and LCD are provided in **Section 7** of this report.

4.2 Methodology Details

As with the CDD disposal methodology, the CDD diversion estimate methodology relies upon the use of collected data to the extent practical, then uses an extrapolation of known data for the remaining states where data are not reported. The extrapolation is performed by developing a unit diversion rate per permitted or registered CDD processing facility for the states where data are available.

Table 4-1 displays the states where CDD diversion data were available and subsequently used to create the unit diversion rate figure.

Table 4-1. Listing of States and Corresponding Reporting Agency where CDD Diversion Data Were Available and Used in the 2011 Unit CDD Diversion Per Facility Estimate

State	Reporting Agency	Data Source	Apparent Frequency ¹
Colorado	Department of Public Health and Environment	http://www.colorado.gov/cs/Satellite/CDPHE/HM/CBON/1251616361671	Annually
Florida	Department of Environmental Protection	http://www.dep.state.fl.us/waste/quick_topics/publications/default.htm	Annually

² As discussed in the previous section, a fraction of combusted CDD is included in disposal estimates as several states track combustion amounts together with the landfilled amounts.

State	Reporting Agency	Data Source	Apparent Frequency ¹
Maine	Department of Environmental Protection	http://www.maine.gov/dep/sustainability/publications/	Annually (last reported for 2011)
Maryland	Department of the Environment	http://www.mde.state.md.us/programs/Land/RecyclingandOperationsprogram/Publications/Pages/Programs/LandPrograms/Recycling/publications/index.aspx#recycling	Annually
Massachusetts	Department of Environmental Protection	http://www.mass.gov/eea/agencies/massdep/recycle/reports/solid-waste-master-plan.html	Annually (last reported for 2011)
New Jersey	Department of Environmental Protection	http://www.nj.gov/dep/dshw/recycling/stats.htm	Annually (last reported for 2011)
Pennsylvania	Department of Environmental Protection	http://www.portal.state.pa.us/portal/server.pt?open=512&objID=14060&PageID=589559&mode=2	Annually
Texas	Commission of Environmental Quality	http://www.tceq.texas.gov/permitting/waste_permits/waste_planning/wp_swasteplan.html	Annually
Virginia	Department of Environmental Quality	http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/ReportsPublications/AnnualSolidWasteReports.aspx	Annually
Washington	Department of Ecology	http://www.ecy.wa.gov/beyondwaste/bwprogGBCandD.html	Annually (last reported for 2011)

Note: 1. The apparent frequency was established based on an examination of the frequency of historically-produced reports. This figure is not intended to be a prediction of the frequency of future report publications.

The number of registered or permitted CDD processing facilities was catalogued as part of a draft report prepared by US EPA (2013). The processing facility listing was developed to reflect facilities that exclusively process CDD (i.e., the listing does not include facilities such as MSW material recovery facilities (MRFs) that process multiple waste types that are generally not defined as CDD in state regulations). As most MSW MRFs process source-segregated MSW recyclables, CDD managed by these facilities is expected to be insignificant. Although waste received at mixed MSW MRFs (also known as *dirty MRFs*) may contain some CDD, mixed waste processing for material recovery is not a dominant management method in the US.

Equation 4-1 shows the procedure for computing the CDD diversion rate in the US, which incorporates known data and extrapolates this data to the states where CDD diversion quantity data are not available.

$$T_D = \sum_i^s T_{TCR_i} + n_{F,ND} \times \frac{\sum_i^s T_{TCR_i}}{\sum_i^s n_{P_i}} \quad \text{(Equation 4-1)}$$

Where,

T_D = The total CDD diversion amount (tons for the calculation year of interest)

T_{TCR_i} = Total CDD diversion quantity for the i^{th} state that has CDD diversion data available (tons for the calculation year of interest).

$n_{F,ND}$ = total number of CDD processing facilities in US states where no data are available for the calculation year of interest.

n_{p_i} = The number of CDD processing facilities in the i^{th} state that has CDD diversion data available for the calculation year of interest.

s = Total number of states with CDD diversion data available for the calculation year of interest.

The inventory of registered and permitted processing facilities was developed in 2012. The facilities inventory was developed primarily from lists gathered directly from states. In limited cases where a list of CDD processors was not available for a given state, CDD processing facilities were identified based on information in Waste Business Journal (WBJ 2012) and a listing of companies in 2012 that were members of the Construction Materials Recycling Association (now the Construction and Demolition Recycling Association). The state-level CDD processing facility inventory is provided in **Appendix C**.

4.3 Comparison of Actual Versus Extrapolated CDD Diversion Data

To demonstrate the relative weight of the CDD diversion estimate methodology of actual (i.e., state-reported) data compared to extrapolated data, the CDD diversion methodology was used to calculate diversion amounts for the calendar year 2011. When comparing the CDD diverted based on state-reported data (17 million tons) to the total CDD diversion including the extrapolated data (55 million tons), the fraction of the diversion estimate corresponding to actual data is 31 percent.

4.4 Limitations Associated with the Methodology to Estimate CDD Diversion

The proposed methodology to estimate the CDD diversion has the following limitations:

1. CDD processing facility size and recovery rate. The methodology estimates average CDD amount recovered per facility based on the statewide aggregated CDD diversion amounts and the number of CDD processing facilities in the states. The estimated average diverted amount is used to extrapolate data for the states that do not track data. The methodology, in essence, assumes that the CDD diversion rate (amount diverted per facility) is the same for all the states. The methodology, therefore, does not consider variation in processing technology and associated recovery rates among states. A nationwide survey of CDD processing technologies is needed to assess the impact of processing facility technology and size on facility diversion rate.
2. Source-segregated asphalt pavement, concrete and LCD. Source-segregated asphalt pavement, concrete and LCD from large-scale infrastructure projects (e.g., highway construction, bridge demolition, pavement rehabilitation) are typically processed on-site or at facilities that are exempted from state CDD/solid waste regulations. The CDD diversion amount methodology presented above does not include the amount of asphalt, concrete or LCD recycled on-site or by the facilities exempted from the CDD/solid waste management regulations. More details on asphalt concrete managed by these facilities are presented in Section 5. More details on concrete and LCD managed by these facilities are presented in Section 7.

5. Methodology for Estimating Reclaimed Asphalt Pavement Generation and Management in the US

5.1 Overview

RAP represents a major component of the CDD stream. As discussed in **Section 4**, several states exempt RAP from the definition of CDD or from being defined as a solid waste, but this is likely a function of the manner by which the material is generated, the fairly homogeneous characteristics of the material, and the manner in which the material is normally handled after it is milled from an existing roadway. Ultimately, this material meets the definition and scope of materials in the overall CDD generation and management methodology, thus a method to estimate the quantity of this material is warranted. The estimation of RAP generation and management, however, requires a different approach than those described previously since RAP is typically managed outside of permitted or registered solid waste management facilities.

Industry and survey data were assessed for potential inclusion in the RAP production and management estimate along with the data reported from the USGS. Data from a survey conducted by the National Asphalt Pavement Association (NAPA) was selected as the basis for the RAP generation estimate. Specifically, the NAPA survey was used to evaluate the quantity of RAP that was recycled, since the disposed quantities were already included within the measured and calculated estimates described in **Section 3**. While the USGS publishes information on recycled RAP quantities in the US, the USEPA found that the entities surveyed by the USGS overlapped with entities included in the NAPA survey and the CDD processing and recycling facilities that were already addressed as part of **Section 4**. As described below, the NAPA survey focused on asphalt mix producers, which largely are not required to have a solid waste permit or registration, and thus, including these data provides a more complete picture of CDD generation and management in the US that is grounded in facility-reported data.

5.2 National Asphalt Pavement Association Survey

NAPA has conducted annual surveys of asphalt mix producers in the US since 2009 to estimate the amount of RAP received, disposed, and reused (NAPA 2013). NAPA published data in 2013 corresponding to calendar years 2009, 2010, and 2011. The surveys are funded by the Federal Highway Administration and NAPA plans to continue conducting the survey in future years.

As asphalt mix plants are not typically regulated under solid waste rules, the amount of RAP managed by these facilities would not be accounted for in the state-compiled CDD quantities. These surveys report the amount of RAP received by the asphalt mix producers along with the amounts reused or recycled for asphalt production (e.g., hot-mix, warm-mix, and cold-mix), amounts used as aggregates and other uses, and the amount landfilled. NAPA surveyed all 50 states, the District of Columbia, and US territories, and in the most recent survey (2011), responses were received from 1,091 asphalt plants operated by 203 companies in 49 states.

Although specific disposal data are included in the survey, the reported disposal quantity (which is relatively small - less than 1 percent of all RAP generated) should be excluded from the analysis, since this material is accounted for as part of the CDD disposal methodology described in **Section 3**. Based on this survey, NAPA reported that the hot mix asphalt plants in the US recycled approximately 73 million tons of RAP in 2011 for recycling; approximately 36% of the amount was actually reported by the survey respondents and the rest was estimated.

The portion of the NAPA survey that should be used in the overall CDD management estimate for the US EPA is the quantity of RAP accepted for recycling. The US EPA developed an alternative methodology for RAP in the event that the NAPA survey is not conducted in the future – **Appendix D** presents details of this alternative methodology.

6. Methodology to Estimate Composition of CDD Managed at Permitted or Registered Disposal or Processing Facilities

6.1 CDD Composition at Disposal Facilities

The US EPA gathered multiple large-scale waste composition or waste characterization studies. A total of 14 waste composition studies that focused solely on CDD or MSW with a distinct CDD component were identified. A more detailed discussion of waste composition methodologies and each of the 14 composition studies is presented in **Appendix E**.

Of the 14 studies examined, a total of five studies were selected for further analysis – some reports were filtered out because the study did not explicitly state the total quantity of CDD represented by the study, did not separately analyze specific components of CDD, or the study overlapped another study (e.g., a state-wide study in Illinois was selected but a Chicago-specific study was excluded). As discussed in CCG (2009), the data used to estimate the CDD composition in King County, WA, specifically excluded characterization of CDD waste originating from Seattle, WA.

Major CDD material categories were revised from those presented in Appendix E to provide additional detail regarding individual aggregates (i.e., asphalt, concrete, fines), allow consistency with material categories provided in CDD diversion data, and to combine those materials which were consistently observed in the studies as only representing a very small fraction of CDD (i.e., less than 4% by weight of the total). The disaggregation of amounts into subcategories was based on the data from the studies that specifically denoted these amounts. **Table 6-1** presents a summary of each of the studies analyzed, the total amount of CDD materials represented by each study, and the breakdown of each material category.

Table 6-1. CDD Composition Data from Large-Scale Characterization Studies in the US

Major Material Fractions	RW. Beck et al (2010) - Statewide CDD Characterization Study (GA)	CDM (2009) - Illinois Commodity/ Waste Generation and Characterization Study	CCG (2006) - Detailed Characterization of CDD (CA - 4 metro areas)	CCG (2008) - 2007 CDD Composition Study (Seattle, WA)	CCG (2009) - 2007/2008 CDD Characterization Study (King County, WA)
Asphalt	2.50%	0.40%	10.00%	0.70%	0.30%
Concrete	15.20%	14.40%	10.80%	3.70%	2.70%
Fines	10.50%	6.80%	6.60%	5.50%	2.45%
Wood	16.20%	24.20%	20.20%	36.00%	34.51%
Roofing	19.90%	21.60%	14.60%	13.40%	15.06%
Gypsum	7.00%	7.40%	8.10%	11.00%	15.78%
Organics	1.80%	1.40%	1.50%	1.90%	1.73%
Metal	3.00%	0.60%	4.00%	3.80%	4.26%
Other Materials	14.90%	10.00%	16.10%	19.40%	20.31%
Other Aggregates	8.90%	13.00%	8.00%	4.60%	2.89%

Study Disposed Represented	CDD Tons	2,952,123	1,598,203	3,130,925	201,156	158,821
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In all, the five CDD composition studies represented more than 3,000 individual CDD loads or samples collected at 55 different waste management facilities with the sample size representing approximately 8 million tons of disposed CDD. The results of the five studies were used to calculate the weighted composition of disposed CDD. The composition data from the study reports consisted of 191 unique individual material categories that were organized into 10 major material categories. The total weighted disposal amount of each major material category across all studies was summed and divided by the total disposed CDD weight represented by all of the studies to calculate the weighted average composition of each of the 10 material categories. **Figure 6-1** presents the weighted composition of disposed CDD based on results reported in the five studies that were summarized in **Table 6-1**. The predominant material categories that are being sent to disposal facilities include wood, roofing, and concrete, which comprise slightly more than 50% of all disposed CDD. The remaining 50% includes a mix of various other building materials, including generalized “other” categories that include items such as paper, carpet, plastic, rock, and brick.

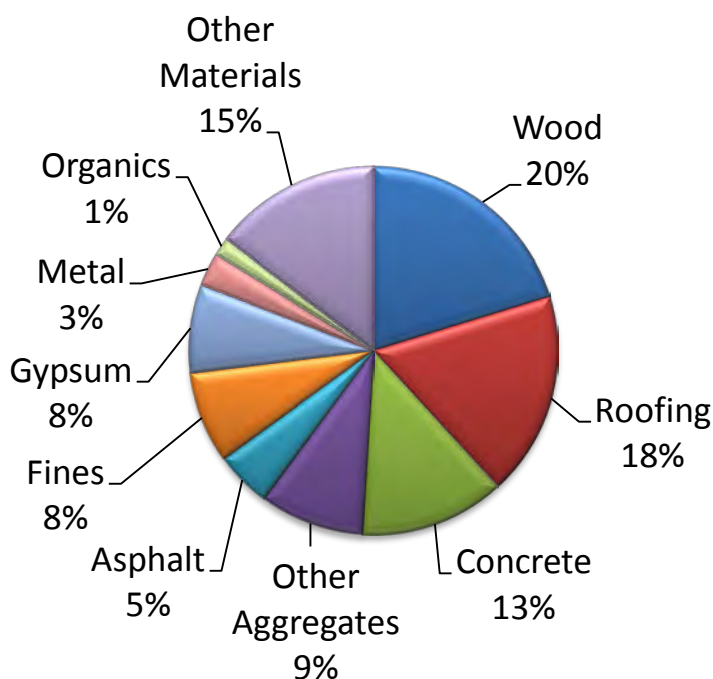


Figure 6-1. Weighted Average Composition of Disposed CDD Based on Results of Five Large-Scale CDD Waste Composition Studies

6.2 CDD Composition at Processing Facilities

The US EPA searched for available sources of material composition diverted by CDD processing facilities. While large-scale composition studies like those evaluated in **Section 6.1** were limited, the US EPA identified four states (Florida, Massachusetts, Washington, and Nevada) that have requirements to report the quantity of different CDD components that are diverted from disposal. Thus, these data were used as a basis to calculate a weighted average CDD composition at CDD processing facilities for the US.

The weighted average composition of different CDD constituents was estimated based on the processed CDD quantities for these states for 2012 except Massachusetts, which relied upon 2011 data (2012 data were not available). Similar to the CDD disposal composition estimate, material categories for the four states differed slightly, so materials were grouped data into the following categories:

- Aggregate - A separated breakout of asphalt, concrete, and brick quantities was not available in each of the state-reported data, so these materials were lumped into the "aggregate" category
- Wood (includes wood used for energy recovery)
- Organics (includes LCD used for energy recovery)
- Fines
- Roofing and shingles debris
- Gypsum
- Metal (includes ferrous and non-ferrous metal)
- Other (includes mixed CDD, plastic, paper, carpet and carpet pad, and textiles, and very small quantities of other materials)

The resulting estimated CDD composition at CDD processing facilities is presented in **Figure 6-2**.

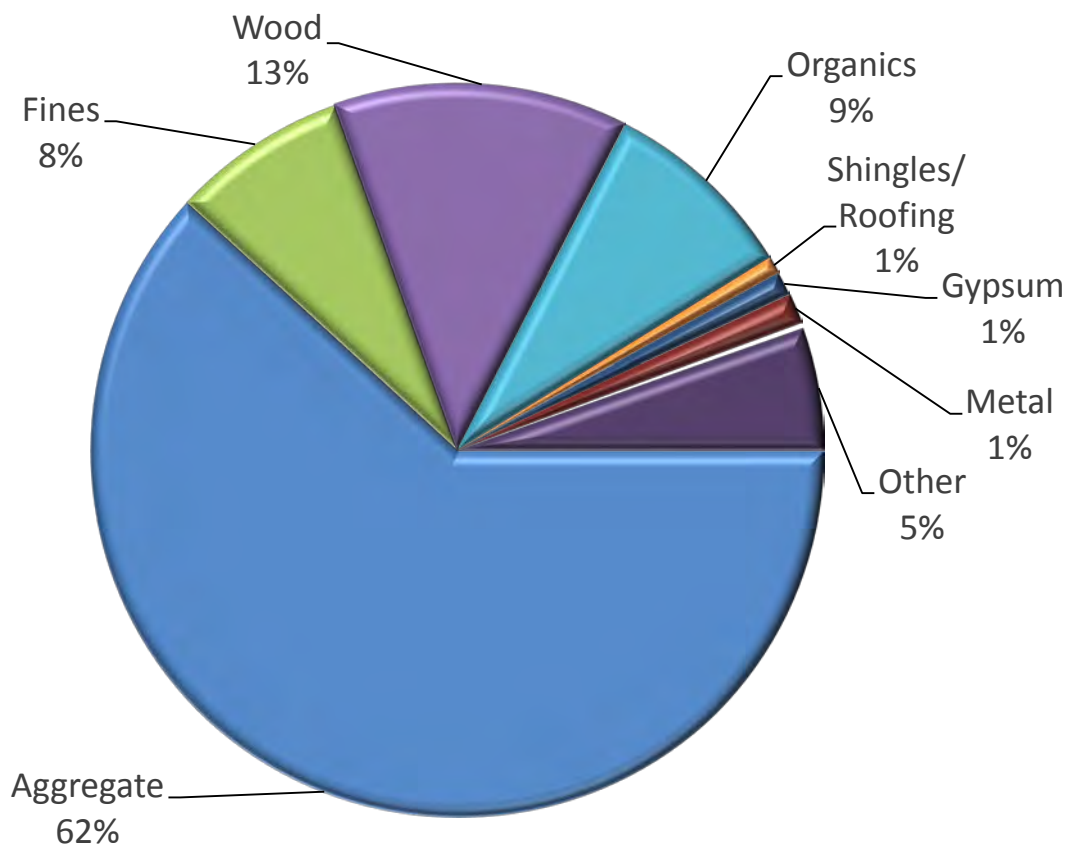


Figure 6-2. Weighted Average Composition of CDD Received at Processing Facilities in Florida (2012), Massachusetts (2011), Nevada (2012), and Washington (2012)

The data were further examined to attempt to understand the potential relative breakdown of materials that comprise the “aggregate” category shown in **Figure 6-2**. Both Florida and Nevada were found to track the quantities of asphalt and concrete separately, while Massachusetts reports asphalt, concrete, and brick combined together. Washington reports asphalt and concrete as a combined figure. The Florida and Nevada data show that a very large proportion of the general “aggregate” category is comprised of concrete. These data were combined and applied to the Massachusetts and Washington data to create a revised estimated weighted average CDD composition in the US. The results are shown in **Figure 6-3**.

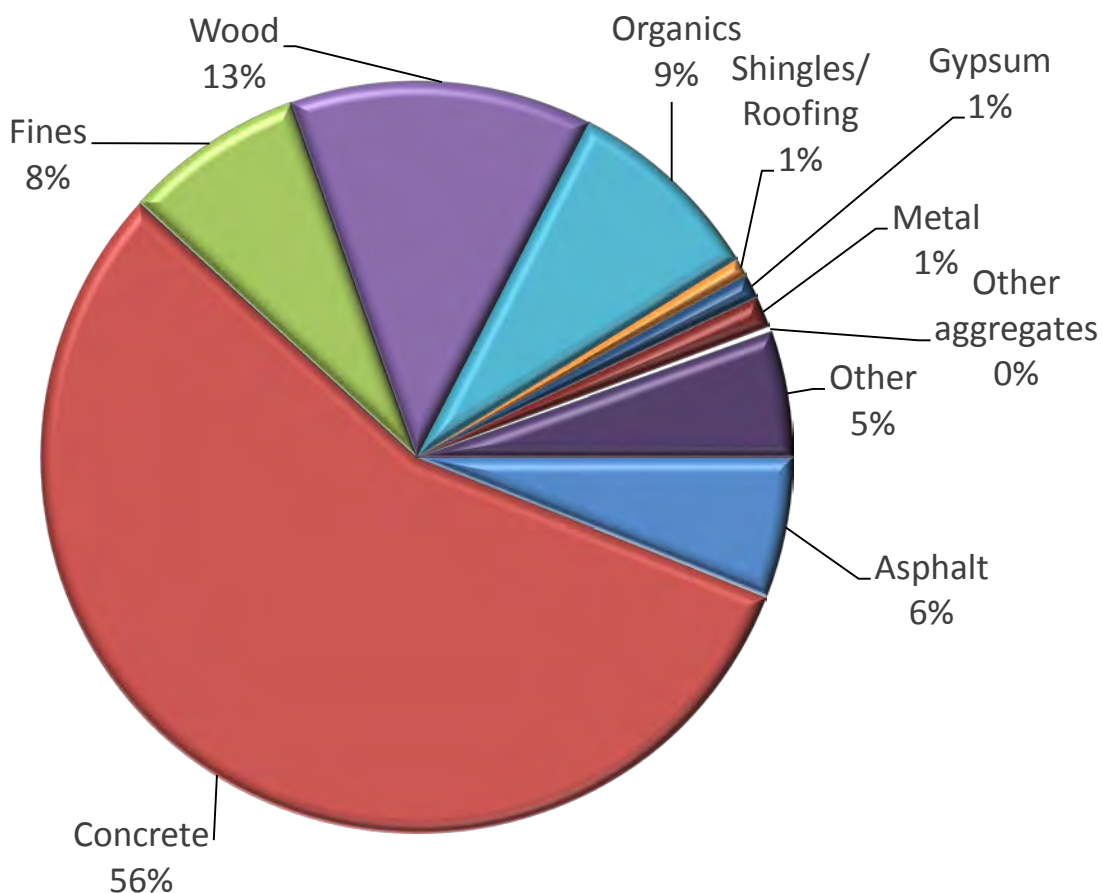


Figure 6-3. Weighted Average Composition of CDD Received at Processing Facilities with Estimated Breakout of Concrete and Asphalt included

The data in **Figure 6-3** show that, upon segregation of asphalt and concrete, that concrete comprises more than half of materials received by CDD processing facilities, while asphalt comprises a relatively small fraction. This information shows that the approach described in **Section 5**, which suggested that the use of the NAPA RAP recycled amounts would not result in substantial double-counting with the recycled amounts described in **Section 4**, is appropriate; NAPA specifically reported recycling of 73 million tons of RAP in 2011, whereas the amount recycled by CDD recycling facility is estimated to be 3.1 million tons.

7. Data and Methodology Notes and Limitations

The methodology developed in this project relied upon available information as reported by states at the time of the analysis. As discussed, additional states may have facility data that are collected but were not necessarily available on the regulatory agency's website. Future efforts that include a survey component could yield additional data that could be used to make the methodology more robust. However, as described in previous sections, the statistical analysis conducted with the data collected in this effort showed positive correlations with dozens of data points across multiple states and across multiple years.

A summary table of the specific data collection requirements for each of the methodology's components is provided in **Appendix F**. This section was developed to highlight other key points and limitations of the data that were used in this methodology.

7.1 Estimate of CDD Concrete

Concrete is a component of mixed CDD, and thus will be captured as part of the generation and composition estimation methodology provided. As previously discussed, however, a large amount of concrete is recycled/beneficially used by facilities that are not typically required to track or report management data. Examples of these facilities include both portable and mobile crushing plants that process concrete and lesser amounts of similar debris (e.g., brick, asphalt pavement) from large building, road and bridge demolition and renovation activities. As **Section 6** showed, concrete comprises more than half of the composition (by weight) of materials at CDD processing facilities. It is likely that concrete from these other sources results in concrete being an even larger component of the overall CDD stream.

As part of the overall goal of the project – to use reported data to produce a CDD generation estimate – an original target was the development of a methodology that would allow an estimate of the mass of concrete processed at crushing plants similar to that approach used for RAP. Thus the US EPA identified different resources that reported the quantity of concrete recycled in the US and examined these resources to assess whether the presented information would allow an estimate of the amount of concrete recycled.

First, the US EPA's examination of state regulations found a significant fraction of states (specifically, states representing approximately 94% of the US population as of 2013) have an exemption in their solid waste management rules for source-segregated clean debris or some analogous term. Clean concrete was frequently found to be an enumerated material that meets the definition of source-segregated clean debris, and as a result these materials are often not required to be managed at permitted or registered solid waste management facilities. Thus, the fact that concrete would generally be expected to meet the definition of source-segregated clean debris indicates that the population of facilities and companies handling the material would likely have no requirement to quantify and report the quantities managed on a routine basis.

US EPA (2003) indicates that the amount of waste concrete generated annually in the US is 200 million tons, but the source of this data point was a personal communication and not derived from on-the-ground data. Thus, using this estimate is not considered appropriate for this methodology. The American Portland Cement Association (2009) cites USGS (2000) for the amount of waste concrete recycled; USGS (2000) used the estimate furnished by the Construction Materials Recycling Association (CDRA), which reported 100 million tons of concrete aggregate recycled annually. CDRA does not provide a basis of its estimate. For these reasons, these numbers are not used in the proposed methodology.

The USGS has surveyed sand and gravel producers and construction and demolition companies for several years and reports a quantity of concrete aggregate sold and used in the US (USGS 2013). The US concrete recycling estimate for the year 2011 was approximately 15.2 million tons. This figure was significantly lower than the other previously-reported estimates of concrete recycling figures. Thus, the USGS was contacted to better understand the information that went into the reported estimate. A voluntary survey form is sent out to sand and gravel companies (approximately 10,000 companies) and construction and demolition companies (approximately 700 companies). The response rate for the sand and gravel companies was about 50%, while the response rate for the construction and demolition companies was 20%. The USGS only reports quantities that are provided in survey responses (i.e., the 15.2 million tons figure was the sum of all reported tons of recycled concrete from survey responses).

The USGS data represents the best available “bottom-up” data set corresponding to recycled quantities of concrete. However, these data are subject to substantial limitations, including the following:

- The survey response rate was low for the construction and demolition companies. Personal communication with USGS found that the list of companies surveyed has not been updated in several years, and many companies have likely closed down and new companies could have been formed that were not captured in the survey. The USGS indicated that a comprehensive update of the survey list would be beneficial to obtaining a more representative and relevant recycled concrete estimate.
- The FHWA (2011) pointed out that accounting for all of the recycled concrete is difficult because a common practice in recycling concrete aggregate is to reuse the material on the same project. Thus, the survey responses are limited only to those companies that stockpiled, marketed, and sold recycled concrete to other entities or projects – material used by the demolished concrete generator or onsite would generally not be quantified.
- The survey may not capture quantities of concrete that are disposed of in locations other than a permitted or registered landfill. Because of its typical clean debris status, some states may allow concrete to be disposed of or “used” in other ways (e.g., lake fills).

The figure reported by the USGS is likely an underestimate – perhaps a significant underestimate – of the amount of concrete aggregate recycled annually in the US. As a result of the limitations described above, and in the absence of a more comprehensive entity or facility survey such as that conducted by NAPA, a separate estimate for concrete generation and management could not be created. In our methodology, concrete disposal could be estimated by multiplying the fraction of concrete in disposed CDD (as presented in **Section 6.1**) with the estimate of total CDD disposal quantity (as described in **Section 3**). The total amount of concrete diverted from disposal could be estimated by multiplying the fraction of concrete in diverted or processed CDD (as presented in **Section 6.2**) with the estimate of the total CDD diverted from disposal (as described in **Section 4**). However, this approach would also result in an underestimate since the total reported and extrapolated amounts that would serve as the basis for the estimate overwhelmingly exclude concrete recycled or beneficially used on-site and in facilities not required to report quantities to state environmental agencies.

7.2 Estimate of Land Clearing Debris

LCD, similar to RAP and concrete, is a material that is often not specifically defined as CDD or is otherwise exempted from solid waste regulations. The US EPA found that states representing

approximately 65% of the US population (as of 2013) either did not include LCD in the definition of CDD or exempted LCD from solid waste regulations altogether. Thus, the majority of the US does not recognize LCD as CDD, but given that some states do, attempts were made to quantify LCD generation to assess whether a reasonable separate methodology could be used in conjunction with the other methods described in **Sections 3, 4, and 5**.

A frequently-cited study conducted by Wiltsee (1998) estimated urban waste wood for a few different generation sources (MSW, industrial sources, and construction and demolition sources) on a per-capita basis based on surveys conducted in 30 metropolitan areas in the US. One of the categories of materials examined by Wiltsee (1998) was CDD wood, which included LCD as a component. However, the LCD estimate was not separated from the estimate of non-LCD wood. The study was clear in indicating that of the different wood categories evaluated, the one with the greatest error and uncertainty was the estimate of CDD wood, which was estimated (weighted average basis) to be 0.076 tons/person-year.

A key takeaway point from Wiltsee (1998) was that most land clearing contractors surveyed across the country manage LCD by burning the wood at the point of generation (e.g., using an air curtain incinerator) rather than taking the wood to a processor or a disposal facility. Furthermore, data gaps disallowed the development of "...even rough estimates of the amounts of wood generated by...land clearing companies" (Wiltsee 1998). The US EPA conducted an analysis of qualitative responses written by Wiltsee (1998) regarding management of LCD and found that of 19 metropolitan areas that had response by LCD contractors, 12 areas showed the predominant management method of LCD was an activity that would not allow the material quantity to be counted (i.e., burned or ground at the point of generation).

Other potential resources were examined to estimate a LCD generation quantity in the US. Hansen et al. (2013) recently published data on new high-resolution imagery that estimates the amount of forest cover loss and gain in the US. However, the data currently does not tie in forest loss with specific activities like land clearing (note that other activities such as industrial harvesting and silvicultural operations could also be a reason for forest loss). Similar limitations were identified in other related publications associated with estimates of forest loss (e.g., Nowak and Greenfield (2009), Drummond and Loveland (2010), and Nowak et al. (2013)).

An examination of state rules confirmed findings of Wiltsee (1998) and others by indicating multiple management options that are available for LCD other than management at a permitted or registered disposal or processing facility. For example, Rule 62-256, Florida Administrative Code allows for open burning of LCD in temporary air curtain incinerators or open piles. In Ohio, open burning of LCD is allowed as long as the atmospheric conditions are appropriate, a visibility hazard is not created, an air curtain incinerator (or equivalent system) is used to curb air contaminant release, and the fire is located a sufficient distance away from inhabited off-property buildings.

Given the observations above and the limitations to accurately quantifying LCD based on typical management techniques of LCD by land clearing contractors, a separate methodology and estimate for LCD is not feasible. Thus, if the quantity of LCD generated and disposed or processed is desired, using the methods and information presented in **Sections 3, 4, and 6** may be appropriate, though some disaggregation of data provided in state reports of CDD composition may be required to isolate LCD from other CDD wood. The US EPA acknowledges that the generation of LCD likely exceeds that which would be estimated using the methodology described herein.

7.3 Specific Weight of CDD Used in Reported State Estimates

Though the distribution was not quantified in this project, typical practice at CDD disposal and processing facilities includes recording incoming material quantities based on volume rather than by weight. This is in contrast to MSW, where most disposal and processing facilities weigh incoming materials. In the case where only volumes are recorded at CDD management facilities, states often require quantities to be reported by weight (i.e., tons) rather than volume, since (for example) many state recycling goals are based on the weight of material rather than volume. Therefore, a conversion factor is typically applied to report the weight of CDD managed. The US EPA conducted a brief evaluation to assess the variety of conversion factors used in different states.

Table 7-1. Examples of CDD Specific Weight Amounts Published in State Rules or Guidance Documents

State	CDD Specific Weight (lb/yd ³)	Notes
Florida	484	This is used in CDD reporting for facilities to convert volume to weight, which was based on a study of as-received CDD materials
Kansas	1,800	Clean rubble only
	500	Mixed CDD with small amounts of clean rubble
	1,250	Mixed CDD with appreciable amounts of clean rubble
Minnesota	460	2007 study found the value of 460 lb/yd ³ , but previous to this study, the conversion factor used in the state was 1,100 lb/yd ³
New York	1,500	This is used in CDD reporting for facilities to convert volume to weight

The information shown in **Table 7-1** highlights that there can be some differences in conversion factors used by facilities (or by the state) when converting raw materials acceptance information to a weight basis, with an approximate factor of three difference between New York and the other three states. In addition to a variable specific weight, some states report volumetric data as received (e.g., Michigan reports CDD quantities in terms of yd³).

Except for Michigan disposal data (which was multiplied by a 0.24 tons/cubic yard conversion factor) the data that were collected by individual states for use in the estimates presented in **Section 3** and **Section 4** were not normalized or otherwise transformed to a common specific weight unit.

7.4 The Use of Volume as the Quantity Unit Collected at the Facility Level

As described in **Section 7.3**, CDD management facilities often collect incoming material quantity data in terms of a volume, typically yd³. This practice can result in over- or under-estimation of actual CDD material quantities. Two ways that volume estimations can impact overall material quantity estimates are described below.

First, the estimate of the volume of material in an incoming load is necessarily based on a visual approximation. Incoming loads may be judged to be half full, three-quarters full, or some other amount, and recorded as such. While the operator at the receiving gate conducting these volume estimates would be expected to provide accurate estimations (particularly since many CDD facilities charge tipping fees based on the received volume of material), this can result in some amount of error. The amount of potential error was not quantified, but it bears mentioning that consistent under- or over-approximations of received CDD volumes could aggregate over time and skew reported data one way or another.

A second way that volume-based material quantity estimates could impact reported CDD quantities managed lies in the way that the facility may charge incoming loads to accept the materials. Specifically, the policy at the facility could be to charge by container size. So in contrast to that described in the previous paragraph, a facility may have a policy that an incoming load in a 20 yd³ container will be charged (and thus recorded in the facility's material acceptance log) as 20 yd³ of material, regardless of how full the container is. The degree that this is practiced at CDD management facilities was not quantified, but has been the policy at CDD management facilities that the US EPA has worked with in the past.

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Appendix A

State CDD Regulatory Summary

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1. State CDD Management and Regulation Summaries

Descriptions of the data quality categories are discussed in detail in section 3.2. Review of that section will help in understanding the state level data presented in this Appendix.

1.1 Alabama

Definition

The Alabama Department of Environmental Management Administrative (ADEM) (Land Division – Solid Waste Program, Division 13) (ADEM Admin. Code r. 335-13-1-.03(28)) defines CDD debris as:

“ waste building materials, packaging, and rubble resulting from construction, remodeling, repair, or demolition operations on houses, commercial buildings, and other structures. Such wastes include, but are not limited to, masonry materials, sheet rock, roofing waste, insulation (not including asbestos), scrap metal, and wood products. Uncontaminated concrete, soil, brick, waste asphalt paving, ash resulting from the combustion of untreated wood, rock, and similar materials are excluded from this definition.”

Although the state regulations do not specifically address land clearing debris management, the typical components of land clearing debris (e.g., soil, rock, stumps, limbs, and leaves) are excluded from the definition of rubbish and by an extension from the definition of solid waste.

Exemptions

The state regulations, as reproduced above, specifically exclude uncontaminated concrete, brick, waste asphalt paving, and ash resulting from the combustion of untreated wood.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Construction/demolition – inert landfill units (C/DLF) – can receive construction/demolition waste, and/or rubbish and/or waste treatment (alum) sludge, and foundry waste.
2. Municipal solid waste landfill units (MSWLF)
3. Industrial landfill units – can receive industrial solid waste and may in addition receive construction/demolition waste and/or rubbish.
4. Materials Recovery Facility
5. Composting Facility

CDD Debris Disposal and Recycling Amounts

ADEM Code 335-13 prescribes submission of quarterly reports summarizing the daily amount of waste received by MSWLFs, industrial landfill units, and C/DLFs to ADEM. The Solid Waste and Recyclable Materials Management Act of 2008 established a statewide solid waste disposal fee (\$1/ton or \$0.25/cubic yard) for all solid waste disposed in Alabama landfills. ADEM prepares a biennial report summarizing amounts of in- and out-of-state solid waste disposed of in the different type of landfills in the state.

(<http://adem.alabama.gov/programs/land/landforms/SolidWasteReport10-12.pdf>). The report does not provide the types of waste disposed of at the different types of landfills. For example, the amount of CDD debris disposed of at MSWLFs and industrial landfills is not provided for 2011 and 2012. Using the amount of waste disposed of only at CDD landfills to estimate total CDD disposal would underestimate the amount of in-state CDD debris disposed of since a fraction of the total CDD debris is likely also disposed of at MSWLFs and industrial landfills. Because CDD debris

disposal data are only tracked at one of the three types of landfill types (i.e., CDD landfills), the state CDD disposal data quality category is 0.

Although ADEM does not appear to publically report information of the quantities of CDD debris diverted from disposal, these data should be available with ADEM as MRFs and Composting Facilities are required to report the quantity and type of materials processed.
(<http://www.adem.state.al.us/alEnviroReglaws/files/Division13.pdf>)

Resources

1. Alabama Department of Environmental Management, Land Division – Solid Waste Program, Division 13
<http://www.adem.state.al.us/alEnviroReglaws/files/Division13.pdf>
2. Alabama Department of Environmental Management, Waste/Remediation Programs Page
<http://adem.alabama.gov/programs/land/default.cnt>

1.2 Alaska

Definition

The State regulations (18 AAC 60) do not formally define CDD debris. CDD debris is included in the definition of inert waste, which is defined as follows:

*“solid waste that has a low potential to pollute air or water, and that does not normally attract wildlife; ‘inert waste’ includes coal power plant ash, scrap metal, auto fluff, **construction and demolition waste**, and pavement rubble; “inert waste” does not include asphalt material that contains asbestos.”*

State regulations (18 AAC 60.007) allows the use of wood waste, inert waste, crushed pavement and other similar solid wastes as fill materials with approval by the Department.

Exemptions

Excluded from the definition of inert waste, and therefore CDD waste, is asphalt material containing asbestos.

Several constituents of CDD materials are exempt from the requirements of the solid waste rules unless they are mixed with non-exempt waste or there is an identified threat to health or the environment. Such excluded materials include:

1. Land clearing waste, including excavated dirt, rock, soil, butt ends, and stumps
2. Tree limbs and other foliage or woody debris, sometimes referred to as "slash" in a timber harvest area
3. Bricks, mortar, and Portland cement type concrete, including reinforcing steel that cannot be easily removed
4. Crumb rubber used in asphalt paving
5. Wood waste generated in less than 10 cubic yards yearly (or more if certain conditions are met)
6. Crushed asphalt pavement used in a building pad or parking area as road base, or pavement; or as a material to construct a containment berm for a tank farm

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Inert waste monofills
2. Municipal solid waste landfills (Class I, II, & III) –

CDD Debris Disposal and Recycling Amounts

The state regulations do not specify routine reporting of amount of CDD debris received by disposal facilities to the state – therefore, the state's CDD disposal data quality category is 0.

Resources

1. Department of Environmental Conservation , Solid Waste Management Regulations
<http://dec.alaska.gov/commish/regulations/pdfs/18%20AAC%2060.pdf>
2. Division of Environmental Health Solid Waste Program
<https://dec.alaska.gov/eh/sw/index.htm>

1.3 Arizona

Definition

The Arizona Revised Statutes (ARS §49-701(5)) define construction debris as:

“solid waste derived from the construction, repair, or remodeling of buildings or other structures.”

Furthermore, ARS §49-701(7) defines demolition debris as:

“solid waste derived from the demolition of buildings or other structures.”

Land clearing debris is included in the definition of vegetative waste, which is:

“waste derived from plants, including tree limbs and branches, stumps, grass clippings and other waste plant material. Vegetative waste does not include processed lumber, paper, cardboard and other manufactured products that are derived from plant material.”

Exemptions

The state regulations (ARS §49-701.01(15, 17)) exclude the following CDD debris from state solid waste regulations:

1. Inert material – includes concrete, asphaltic pavement, brick, rock, gravel, sand, soil, metal (if used as reinforcement in concrete)
2. Landscaping rubble used to reclaim land

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD landfills – as non-MSW (NMSW) landfills
2. Private landfills – accept permitted wastes generated on-site, may be CDD debris
3. MSW Landfills
4. Transfer Facility

CDD Debris Disposal and Recycling Amounts

The Arizona Department of Environmental Quality (ADEQ) requires quarterly reports by the MSW, CDD/NMSW, and private landfills. These quarterly reports include disposal tonnages which are used to create Annual Landfill Tonnage Reports available via the ADEQ Solid Waste Management Facilities Information page (<http://www.azdeq.gov/environ/waste/solid/map.html>). The report does not provide types of waste disposed of at the different type of landfills. For example, the amount of CDD debris disposed of at MSWLF is not identified. Therefore, the state's CDD disposal data quality category is “not available”.

Resources

1. Arizona Revised Statutes, Title 49 Chapter 4
<http://www.azleg.state.az.us/ArizonaRevisedStatutes.asp?Title=49>
2. Arizona Department of Environmental Quality, Solid Waste Management Related Statutes and Rules
<http://www.azdeq.gov/environ/waste/solid/rules.html>
3. Arizona Solid Waste Management page
<http://www.azdeq.gov/environ/waste/solid/index.html>
4. Non-Municipal Solid Waste Landfills, List of Active NMSWL
<http://www.azdeq.gov/environ/waste/solid/1c.html>
5. Landfill Tonnage Reports

<http://www.azdeg.gov/environ/waste/solid/map.html>

1.4 Arkansas

Definition

The State of Arkansas (Code Ark. R. §22.102) defines construction and demolition waste as:

“any and all material and debris that might result from the construction or demolition of any building or other manmade structure including but not limited to single and multifamily dwellings, commercial buildings, road and highway construction and repair, remodeling and additions to existing structures and roofing. Materials may include (but are not limited to) dimensional lumber, roofing materials, bricks, concrete blocks, siding, gypsum (drywall), masonry, metal, cardboard, concrete with and without rebar, fill materials (including earth, gravel and stone), glass, and any other material that may be used in any construction project or may be salvaged from any demolition project.”

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations (Code Ark. R. §22.801(e)(1,5)):

1. The composting of less than 50 (fifty) tons or 500 (five hundred) cubic yards per year of incoming yard waste, silvacultural activities such as tree prunings and land clearing debris, and agricultural waste or other approved wastes.
 - a. Assumption: one cubic yard of loose, unshredded yard waste excluding manures weighs 200 pounds.
2. The recovery and use of chipped, shredded or processed wood waste, excluding yard waste, for reuse as a mulch, composting material or other beneficial use.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Class IV Landfills – wastes include construction and demolition wastes, appliances, furniture, stumps, limbs, and other bulky wastes
2. Construction and Demolition Recovery Facilities (CDDRF)
3. Class I Landfills – nonhazardous household, commercial, and industrial solid waste

CDD Debris Disposal and Recycling Amounts

Solid Waste Recovery Facilities and Transfer Stations must submit annual reports. Landfills (including Class I and Class IV) submit annual landfill survey forms (http://www.adeq.state.ar.us/solwaste/branch_programs/pdfs/survey_forms_landfills.pdf) identifying the amount of CDD waste, in tons, disposed. However, because this information was not found, the state's CDD disposal data quality category is 0.

Resources

1. Regulation 22, Arkansas Solid Waste Management Rules
http://www.adeq.state.ar.us/regsf/files/reg22_final_080426.pdf
2. Arkansas Solid Waste Management
<http://www.adeq.state.ar.us/solwaste/>
3. Annual Landfill Survey Form
http://www.adeq.state.ar.us/solwaste/branch_programs/pdfs/survey_forms_landfills.pdf

1.5 California

Definition

The State of California (Cal. Code Regs. tit. 14, §17225.14) defines construction and demolition waste as:

“nonhazardous waste building materials, packaging and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings and other structures.”

Additionally,

“Inert Debris” means solid waste and recyclable materials that are source separated or separated for reuse and do not contain hazardous waste (as defined in CCR, Title 22, section 66261.3 et. seq.) or soluble pollutants at concentrations in excess of applicable water quality. Inert debris may not contain any putrescible wastes. Gravel, rock, soil, sand and similar materials, whether processed or not, that have never been used in connection with any structure, development, grading or other similar human purpose, or that are uncontaminated, are not inert debris. Such materials may be commingled with inert debris.

1. *Type A inert debris includes concrete (including fiberglass or steel reinforcing bar embedded in the concrete), fully cured asphalt, glass, fiberglass, asphalt or fiberglass roofing shingles, brick, slag, ceramics, plaster, clay and clay products.”*
2. *“Type B inert debris” is solid waste that is specifically determined to be inert by the applicable RWQCB, such as treated industrial wastes and de-watered bentonite-based drilling mud, but excluding Type A inert debris.*

Land clearing debris is not specifically include in CDD definition and it not covered in CDD and inert debris management regulatory requirements.

Exemptions

The following disposal activities do not constitute CDD debris or inert debris operations or facilities for the purpose of this Article and are not required to meet the requirements set (Cal. Code Regs. tit. 14, §17388.2):

1. *Engineered fill activities which have local permits as required, and are carried out in conjunction with a construction project (e.g., building and other construction, bridge and roadway work, development of pathways or riding trails, etc.), and which use uncontaminated concrete and/or fully cured asphalt which has been reduced in particle size to 2" or less as part of a recycling activity and concludes within two years from commencement.*
2. *Inert debris engineered fill activities which conclude within one year of commencement and that meet all requirements of section 17388.3 of Title 14, Division 7, Chapter 3, Article 5.95.*
3. *The use of fully cured asphalt, uncontaminated concrete (including steel reinforcing rods embedded in the concrete), crushed glass, brick, ceramics, clay and clay products, which may be mixed with rock and soil, in connection with road building, road repair, airport runway construction, bridge and roadway work, levee work, flood control work, and all associated activities by Federal, State and local government public works agencies and their contractors.*

Management Facilities

The following categories of solid waste management facilities may accept CDD or specific component of CDD debris:

1. CDD Waste and Inert Debris (CDI) Disposal Facilities – any combination of CDD and inert debris
2. Inert Debris Engineered Fill Operations
3. Inert Debris Type A Disposal Facilities
4. MSW Disposal facilities
5. CDI Processing facilities (small, medium, and large volume)
6. Inert Debris Processing facilities
7. Material Production Facility – a facility that primarily handles raw materials to produce a new product that is a rock product operation (i.e., an “aggregate” operation), a hot mix asphalt plant, or a concrete, concrete product or a Portland cement product manufacturing facility.
8. CDD Wood Debris Chipping and Processing Facility – a mulch feedstock for purposes of processing it into CDD mulch

CDD Debris Disposal and Recycling Amounts

CDI disposal facilities and MSW disposal facilities are required to report the amount of waste disposed on a quarterly basis (at CDI facilities, tonnage reported is CDD waste). The FacIT facility reporting system reflects the annual CDD Processing throughput, however, based on the inputs provided by CalRecycle staff these data are primarily estimated from facility files and permits. Typically, the capacity is the permitted maximum that the site is allowed to process and the throughputs are estimated based on a number of sources including the facility’s website, Report of Facility Information, or possibly the city or county’s website. In cases where no throughput information was available, it was estimated as a percentage of capacity (for CDD processors, it was 50%). Data in FacIT are updated annually or as facilities choose. Additionally, the amount of waste disposed per landfill is reported annually, available on the CalRecycle database (<http://www.calrecycle.ca.gov/SWFacilities/Landfills/Tonnages/>). These reports do not provide the types of waste disposed of at different types of landfills. For example, the amount of CDD disposed of at a MSWLF is not provided. Therefore, the state’s CDD disposal data quality category is 0.

The only actual tonnages listed are those for landfills, beneficial reuse, and Alternative Daily Cover (ADC)/Alternative Intermediate Cover (AIC). CalRecycle completed a Waste Characterization Study in 2008 that may be used for estimating CDD disposal amount to be 16% of the total waste disposed. CDI recycling centers and inert debris recycling center operators may report their residual percentages to the CalRecycle Local Enforcement Authority on the “Voluntary Residual Percentage Reporting Form,” CIWMB 607 per state regulations (Section 17381.1(b)(1)).

Resources

1. California Disposal Reporting System (landfill, beneficial use, and cover data)
<http://www.calrecycle.ca.gov/LGCentral/Reports/DRS/>
2. California Minimum Standards for Solid Waste Handling and Disposal
<http://www.calrecycle.ca.gov/Laws/Regulations/Title14/ch3a595a.htm>
3. CalRecycle Facility Information Toolbox Estimated Facility Capacity and Throughput
<http://www.calrecycle.ca.gov/FacIT/Facility/CapacityThroughput.aspx>
4. 2008 Waste Characterization Study
<http://www.calrecycle.ca.gov/wastechar/wastestudies.htm#2008Study>
5. 2006 Targeted Statewide Waste Characterization Study: Detailed Characterization of Construction and Demolition Waste
<http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=1185>

6. Landfill Tonnage Reports
<http://www.calrecycle.ca.gov/SWFacilities/Landfills/Tonnages/>
7. CalRecycle Construction and Demolition Debris Recycling Information
<http://www.calrecycle.ca.gov/ConDemo/>

1.6 Colorado

Definition

The State of Colorado (6 CCR 1007-2 Part 1 §1.2) defines construction and demolition debris as:

“waste that is generated from construction, remodeling, repairs, or demolition of buildings, pavements, and other structures which includes but is not limited to, lumber, bricks, carpets, ceramics, sheetrock, metals, drywall, window glass, metal and plastic piping, paint and any other non-hazardous materials resulting from construction and demolition operations.”

Based on the above definition, it does not appear that land clearing debris is included in construction and demolition debris – it appears that land clearing debris would be considered green waste, which is given the following definition:

“means any plant material that is either separated at the point of generation, or separated at a centralized facility. Green waste includes, but is not limited to, yard trimmings, plant wastes from the food processing industry, untreated wood wastes, paper products and pre-consumer vegetative food waste.”

Exemptions

The state regulations exclude the following CDD debris from Section 8.5 (Industrial recycling operations) of 6 CCR 1007-2 Part 1 Solid Waste Disposal Sites and Facilities:

1. Concrete and asphalt operations when the material is managed like a commodity by meeting the following conditions:
 - a. Material is managed and separated into commodity specific piles processed for reuse.
 - b. Material is managed in active piles separated by material type or use within the past year.
 - c. Incoming loads shall have all non-concrete, non-asphalt and non-rebar material removed from concrete and asphalt materials within thirty (30) calendar days and non-concrete, non-asphalt and non-rebar material shall not exceed 10% of the total material onsite by weight or volume.
2. On-site recycling operations where the processing of recyclable materials occurs on the same site from where the recyclable materials are generated.
3. Pre-approved Beneficial Uses – the following CDD materials are preapproved for specific uses:
 - a. Reclaimed asphalt
 - b. Reclaimed concrete
 - c. Reclaimed brick and stone
 - d. Non-chemically treated wood
 - e. Glass
 - f. Clean reclaimed porcelain

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Inert waste landfills – accept CDD waste that is considered inert waste. Inert material is defined as non-water soluble and non-putrescible solids, which includes materials such as earth, sand, gravel rock, concrete, masonry, asphalt paving fragments, and other inert solids.
2. MSW Landfills – standard practice for the state is for CDD to be disposed of at MSW landfills.
3. Industrial Recycling Operators – include the recycling of CDD Debris

4. Material Recovery Facilities
5. Transfer Stations
6. Incinerators

CDD Debris Disposal and Recycling Amounts

A Solid Waste User Fee Form exists for waste disposal sites to complete on a quarterly basis, where the amount of materials accepted at the facility (organized by method of transport) must be reported on a volumetric basis.

(<http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251616360987>)

Periodic CDD disposal data was not found for the state – only total statewide landfill disposal statistics. (<http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251616361671>) Therefore, the state's CDD disposal data quality category is 0.

However, CDD diversion data are currently provided for 2007-2012. This is probably the result of the completion of the Recycling Facility Annual Reporting Form found in the same location as the Solid Waste User Fee Form. While the form does not specifically request CDD tonnages diverted, it does have a “write-in” section where CDD material recovery could be reported.

Resources

1. Colorado Solid Waste Regulations
<http://www.colorado.gov/cs/Satellite/CDPHE-Main/CBON/1251607568997>
2. Colorado Section 8 Recycling and Beneficial Use Regulations Page
<http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251623305968>

1.7 Connecticut

Definition

The State of Connecticut (CGS §22a-208x) defines construction and demolition waste as:

“The waste building materials or packaging resulting from construction, remodeling, repair or demolition operations on houses, commercial buildings, and other structures, excluding asbestos, clean fill as defined in regulations adopted under section 22a-209 of the general statutes, or solid waste containing greater than de minimis quantities, as determined by the commissioner of environmental protection, of (A) radioactive material regulated pursuant to section 22a-148 of the general statutes, (B) hazardous waste as defined in section 22a-115 of the general statutes, and (C) liquid and semi-liquid materials including but not limited to adhesives, paints, coatings, sealants, preservatives, strippers, cleaning agents, oils and tars.”

The majority of materials from construction and demolition activities are managed as a type of bulky waste. Bulky waste (as listed in Regulations 22a-209-1) includes:

“landclearing debris and waste resulting directly from demolition activities other than clean fill”

Additionally, processed construction and demolition wood is defined as:

“The wood portion of construction and demolition waste which has been sorted to remove plastics, plaster, gypsum wallboard, asbestos, asphalt shingles, regulated wood fuel as defined in section 22a-209a and wood which contains creosote or to which pesticides have been applied or which contains substances defined as hazardous waste under section 22a-115.”

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations:

1. Recycled wood (CGS §22a-209a)– Such wood is received for use at a biomass gasification plant or a resource recovery facility as a regulated wood fuel, used for land application in accordance with standards, or used for building products or other uses in accordance with any applicable state or federal standards.
2. Clean fill defined as follows is exempted from the state solid waste regulations (Regulations 22a-209-3):
“Clean fill” means (1) natural soil (2) rock, brick, ceramics, concrete, and asphalt paving fragments which are virtually inert and pose neither a pollution threat to ground or surface waters nor a fire hazard and (3) polluted soil as defined in subdivision (45) of subsection (a) of section 22a-133k-1 of the Regulations of Connecticut State Agencies which soil has been treated to reduce the concentration of pollutants to levels which do not exceed the applicable pollutant mobility criteria and direct exposure criteria established in sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies and which soil is reused in accordance with R.C.S.A. subdivision (3) of subsection (h) of section 22a-133k-2 of such regulations.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Bulky waste landfill
2. MSW Landfill
3. CDD Waste Processing Facility – volume reduction plant (VRP) for CDD waste

4. Land clearing/Clean wood Processing Facility
5. Asphalt Shingle Recycler
6. Biomass gasification plant – processed construction and demolition wood

CDD Debris Disposal and Recycling Amounts

CDD Waste Processing VRPs are required to report the amount of CDD debris processed on a quarterly basis ([http://www.ct.gov/deep/lib/deep/reduce_reuse_recycle/forms/c and d_vrp_report_form.pdf](http://www.ct.gov/deep/lib/deep/reduce_reuse_recycle/forms/c_and_d_vrp_report_form.pdf)).

However, CDD diversion information was not found on the Department of Energy and Environmental Protection website. Currently, there are solid waste regulatory revisions being considered as of 2008; there are also forms being developed which could require facilities in bulky waste and MSW landfills to report CDD tonnages annually. However, because not all facilities appear to separately be reporting CDD disposal tonnages, the state's CDD disposal data quality category is 0.

Resources

1. Connecticut DEEP Construction and Demolition Waste Page
http://www.ct.gov/deep/cwp/view.asp?a=2718&q=325402&deepNav_GID=1645
2. Connecticut DEEP Solid Waste Management Page
http://www.ct.gov/deep/cwp/view.asp?a=2718&q=325464&deepNav_GID=1646
3. Supplement to the General Statutes of Connecticut, Solid Waste Management (CGS)
<http://www.cga.ct.gov/2011/pub/chap446d.htm>
4. Regulations for Solid Waste Management (RCSA)
http://www.ct.gov/sots/lib/sots/regulations/title_22a/209.pdf
5. Connecticut Solid Waste Data Reports
http://www.ct.gov/deep/cwp/view.asp?a=2714&q=453366&deepNav_GID=1645#In
6. CDD Waste Volume Reduction Plant Quarterly Reporting Form
[http://www.ct.gov/deep/lib/deep/reduce_reuse_recycle/forms/c and d_vrp_report_form.pdf](http://www.ct.gov/deep/lib/deep/reduce_reuse_recycle/forms/c_and_d_vrp_report_form.pdf)

1.8 Delaware

Definition

The State of Delaware (1 Del. Admin. C §501-2) defines construction and demolition waste as:

“the nonhazardous component of dry waste comprised of discarded materials from construction, restoration and demolition activities and projects. In order to meet this definition, construction and demolition waste must be free of any commingled municipal solid waste or dry waste from other sources.”

Dry waste is given the following definition:

“any solid waste including, but not limited to construction and demolition waste, plastics, rubber, lumber, trees, stumps, vegetative matter, asphalt pavement, asphaltic products incidental to construction/demolition debris, or other materials which have reduced potential for environmental degradation and leachate production.”

Based on the above definitions, it appears that land clearing debris is included in the definition of CDD.

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations:

1. Asphalt shingles – granted a recycling approval, asphalt shingle recycling

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. MSW Landfills – DSWA is currently operating three MSW landfills, one of which historically has processed CDD to remove metals and wallboard prior to grinding the remainder for use as an alternative cover.

CDD Debris Disposal and Recycling Amounts

Periodic disposal/diversion reporting forms were not located on DWSA's website.

According to the Delaware Solid Waste Authority (DSWA) 2012 Annual Report, there is a policy in place in Delaware where CDD waste is not accepted at DSWA transfer stations. CDD waste for disposal must be delivered to DSWA landfills where it may be processed. At the DSWA MSW landfills, CDD waste is processed and sold for reuse, and the remaining residue is used on-site, processed through the grinder and used as alternative daily cover.

CDD processed for use as alternative cover material at MSW landfills is reported on an annual basis in tons, but this tonnage is not necessarily representative of the total amount of CDD diversion which is occurring if some portion of the processed material is marketed. A 2013 annual report discussed that in 2012 a new CDD MRF came online which is recovering additional CDD materials. Because it is not clear from periodic DSWA reports whether all CDD disposal data is being tracked, specifically with respect to quantities of material being diverted, the state's CDD disposal data quality category is 0.

Resources

1. DSWA Annual Reports
http://www.dswa.com/about_annualreport.asp

2. Regulations of the Delaware Solid Waste Authority
<http://regulations.delaware.gov/AdminCode/title1/500/501.pdf>

1.9 Florida

Definition

The State of Florida defines construction and demolition debris as:

“discarded materials generally considered to be not water soluble and non-hazardous in nature, including but not limited to steel, glass, brick, concrete, asphalt material, pipe, gypsum wallboard, and lumber, from the construction or destruction of a structure as part of a construction or demolition project or from the renovation of a structure. The term includes rocks, soils, tree remains, trees, and other vegetative matter that normally results from land clearing or land development operations for a construction project; clean cardboard, paper, plastic, wood, and metal scraps from a construction project; yard trash and unpainted, non-treated wood scraps from sources other than construction or demolition projects; scrap from manufacturing facilities that is the type of material generally used in construction projects and that would meet the definition of construction and demolition debris if it were generated as part of a construction or demolition project, including debris from the construction of manufactured homes and scrap shingles, wallboard, siding concrete, and similar materials from industrial or commercial facilities and de minimis amounts of other non-hazardous wastes that are generated at construction or demolition projects, provided such amounts are consistent with best management practices of the construction and demolition industries. Mixing of construction and demolition debris with other types of solid waste will cause it to be classified as other than construction and demolition debris.”

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations:

- a) Clean debris which has been segregated from other waste and which is used or stored for use as fill or raw material; and
- b) The collection and processing of soil, rocks, vegetative debris, asphalt, and similar materials normally associated with and actually from construction and routine maintenance of roads, when such materials are beneficially used or reused by the generator as part of a road construction or maintenance project.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Class I Landfill: Can also accept other non-hazardous wastes (e.g., municipal solid waste)
2. Class III Landfill
3. Waste Processing Facility
4. CDD Debris Landfill or
5. Yard Trash Disposal Facility- can accept land clearing debris and unpainted, nontreated wood scraps and wood pallets that meet the definition of construction and demolition debris.

CDD Debris Disposal and Recycling Amounts

Of the above four classifications, only CDD landfills and waste processing facilities are required to report the amount of CDD recycled and disposed on an annual basis to the Florida Department of Environmental Protection (FDEP). The facilities in (3) and (4) are not required to weigh incoming solid waste, but in order to make data reporting consistent with that which is done for Class I waste, facilities are required to convert CDD amounts (which is generally collected in terms of cubic yards) to tons. This is accomplished by using a mass conversion ratio of 0.24 ton/yd³. The state is currently

in the process of rulemaking to require Class I and Class III facilities that accept CDD debris to report the amount recycled and disposed of on an annual basis.

FDEP compiles the data reported by these facilities to estimate the amount of CDD disposed and recycled by the county of origin and provides these to the counties for use in annual recycling report preparation. However, FDEP deducts 10% from the total disposal amount corresponding to infrastructure projects (highways and structures) (FDEP refers CDD debris from infrastructure projects to as *non-MSW*); FDEP assumes that 10% of the CDD debris disposed of originates from non-MSW sector. Further not all beneficial uses of CDD debris are considered recycling. The CDD debris uses such as borrow pits and lakes filling, general fills, and daily or intermediate cover are considered disposal

(http://www.dep.state.fl.us/waste/quick_topics/publications/shw/recycling/candd/CDreportinginstructions.pdf). Only the amount of MSW-sector CDD debris that can count towards the County's recycling rate are reported to the counties.

The counties, typically, add the amount CDD debris accepted by the facilities that are not required to report the CDD debris data to FDEP to the FDEP-provided CDD debris amounts to estimate the total disposed and recycled amount of the CDD debris generated within the County. The FDEP summarize the annual reports submitted by the counties and publishes state-wide amount of non-infrastructure CDD disposed and recycled. However, this report does not include the disposal and recycling amount of non-MSW CDD tracked by FDEP based on annual reports submitted by CDD landfills and waste processing facilities. The total amount of CDD debris disposal and recycled (generated within the state) in the state can be estimated by adding the disposal and recycling amounts of non-MSW fraction of CDD debris tracked by FDEP (available from FDEP upon request) to the disposal and recycling amounts reported in the state-wide annual report, respectively.

The registered yard trash disposal facilities are allowed to accept land clearing debris in the state. These facilities are not required to report land clearing debris to the state. Although some fraction of land clearing debris may be reported by counties in their annual reporting, it probably would be reported as yard waste.

As the state-reported data include CDD debris from most of the facilities (either actual or estimated) that can accept CDD debris in the state, the CDD disposal data category for the state is a 3.

Resources

1. Annual Report for a Construction and Demolition Debris Facility
[http://www.dep.state.fl.us/waste/quick_topics/forms/documents/62-701/reduction/62-701.900% 287% 29.pdf](http://www.dep.state.fl.us/waste/quick_topics/forms/documents/62-701/reduction/62-701.900%287%29.pdf)
2. Converting CDD Debris from Volume to Weight
http://www.dep.state.fl.us/waste/quick_topics/publications/shw/recycling/candd/cdconversionformula.pdf
3. Construction and Demolition Debris Recycling and Disposal
http://www.dep.state.fl.us/waste/quick_topics/publications/default.htm

1.10 Georgia

Definition

Rules and Regulation of the State of Georgia, 391-3-4-.01(14)) define construction and demolition waste as:

“waste building materials and rubble resulting from construction, remodeling, repair, and demolition operations on pavements, houses, commercial buildings and other structures. Such waste include , but are not limited to asbestos containing waste, wood, bricks, metal, concrete, wall board, paper, cardboard, inert waste landfill material, and other non-putrescible wastes which have a low potential for groundwater contamination.”

Land clearing debris appears to be defined under “yard trimmings” which has the following definition:

“means leaves, brush, grass, clippings, shrub and tree prunings, discarded Christmas trees, nursery and greenhouse vegetative residuals, and vegetative matter resulting from landscaping development and maintenance other than mining, agricultural, and silvicultural operations”

Exemptions

According to 391-34-.04(7)(a):

“Recovered materials and recovered materials processing facilities are excluded from regulation as solid wastes and solid waste handling facilities. To be considered exempt from regulation, the material must have a known use, reuse, or recycling potential; must be feasibly used, reused, or recycled; and must have been diverted or removed from the solid waste stream for sale, use, reuse , or recycling, whether or not requiring subsequent separation and processing”

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. CDD Waste Landfill
2. Inert Waste Landfill – accepts earth-like CDD materials such as concrete, cured asphalt, rock, bricks, yard trimmings, stumps, limbs, and leaves.
3. MSW Landfill – accepts CDD waste, yard trimmings
4. Transfer Station
5. Waste-to-Energy Facility
6. Processing Facility

CDD Debris Disposal and Recycling Amounts

Of the above-mentioned facilities, the Georgia Department of Natural Resources (DNR) appears to only provide reporting forms for CDD recycling facilities (including requiring the tonnage of specific CDD materials recovered) and landfill disposal facilities (to complete quarterly reporting of the origin of and total tonnages received at landfills with municipal solid waste disposal permits (according to 391-3-4-.17)). DNR provides annual total tonnages accepted at CDD landfills (46 total sites as of 2012) and MSW landfills (54 total sites). Annual tonnages received at inert landfills (1021 total sites) were not found. It does not appear that there is annual tonnage reporting requirements for transfer stations (391-3-4-.06) or solid waste thermal treatment facilities (391-3-4-.08) as listed in 391-3-4-.17.

http://www.gaepd.org/Documents/lpb_solidwaste.html#swforms

However, it appears that inert landfills are required to report the tonnages they are receiving to DNR (http://www.gaepd.org/Files_PDF/techguide/lpb/swreprtreq.pdf)

Georgia only reports the total quantity of CDD received at CDD landfills and because imports and exports of CDD are not being tracked, the state's CDD disposal data category is 0.

Resources

1. Rules and Regulations of the State of Georgia
[http://rules.sos.state.ga.us/cgi-bin/page.cgi?g=GEORGIA_DEPARTMENT_OF_NATURAL_RESOURCES/ENVIRONMENTAL PROTECTION/SOLID_WASTE_MANAGEMENT/index.html&d=1](http://rules.sos.state.ga.us/cgi-bin/page.cgi?g=GEORGIA_DEPARTMENT_OF_NATURAL_RESOURCES/ENVIRONMENTAL_PROTECTION/SOLID_WASTE_MANAGEMENT/index.html&d=1)
2. Georgia Waste Tonnage Totals by Quarter
http://www.gaepd.org/Documents/lpb_solidwaste.html#swforms

1.11 Hawaii

Definition

Hawaii Administrative Rules (HAR) §11-58.1-03 define construction and demolition waste as:

“solid waste, largely inert waste, resulting from the demolition or razing of buildings, of roads, or other structures, such as concrete, rock, brick, bituminous concrete, wood, and masonry, composition roofing and roofing paper, steel, plaster, and minor amounts of other metals, such as copper. Construction and demolition waste does not include cleanup materials contaminated with hazardous substances, friable asbestos, waste paints, solvents, sealers, adhesives, or similar materials.”

HAR §11-58.1-19 states that CDD waste also includes land clearing debris from the clearing of land for construction.

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations:

1. Soil, rock, concrete, or other non-decomposable and/or uncontaminated inert materials – generated onsite and when less than 150 tons per year landfilled on the premises by the owner or person in control of the premises.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD Waste Landfill – Private CDD waste landfills
2. MSW Landfill
3. Transfer Stations
4. Incinerators
5. CDD Recyclers – material or CDD waste specific recycling facilities

CDD Debris Disposal and Recycling Amounts

While state regulations specify that annual reports including waste acceptance quantities are required of disposal facilities, no annual tonnage reporting forms or annual reports providing solid waste disposal/diversion data were found. Therefore, the state’s CDD disposal data category is 0.

Resources

1. Hawaii Solid Waste Management Control Rules
<http://health.hawaii.gov/shwb/files/2013/06/11-5811.pdf>
2. Hawaii Department of Health Solid Waste Section
<http://health.hawaii.gov/shwb/solid-waste/>
3. Minimizing Construction & Demolition Waste
<http://health.hawaii.gov/shwb/files/2013/07/constdem2013.pdf>

1.12 Idaho

Definition

The State of Idaho (Idaho Admin. Code r 58.1.06.005.19) does not define construction and demolition waste specifically. However, certain CDD type wastes are identified in the definition of inert waste. Inert waste is defined as:

“Noncombustible, nonhazardous, and non-putrescible solid wastes that are likely to retain their physical and chemical structure and have a de minimis potential to generate leachate under expected conditions of disposal, which includes resistance to biological attack. “Inert waste” includes, but is not limited to, rock, concrete, cured asphaltic concrete, masonry block, brick, gravel, dirt, inert coal combustion by-products, inert precipitated calcium carbonate and inert component mixture of wood or mill yard debris.”

Exemptions

Inert waste is exempt from solid waste rules (Idaho Admin. Code r 58.1.06.001.03.b). Therefore, the state regulations exclude the following CDD debris from state solid waste regulations:

1. Rock
2. Concrete
3. Cured asphaltic concrete
4. Masonry block
5. Brick
6. Gravel
7. Dirt

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Tier I Non-MSW Landfills – disposal for materials not likely to produce leaching including but not limited to glass, wood, roofing material and paper, ceramics, with capacity less than 2,000 yd³
2. Tier II Non-MSW Landfills – greater than 2,000 yd³
3. Tier III Non-MSW Landfills – regulated similarly to MSW landfills
4. Tier I Processing Facility – including, but not limited to, untreated or unpainted wood, yard waste, sheet rock, and plant residues, with cumulative waste at one time less than 600 yd³.
5. Tier II Processing Facility – manages greater than 2,000 yd³

CDD Debris Disposal and Recycling Amounts

The state regulations do not appear to require waste management facilities to report disposal and recycled amounts. Therefore, the state’s CDD disposal data category is 0.

Resources

1. Idaho Solid Waste Management Rules
<http://adminrules.idaho.gov/rules/current/58/0106.pdf>

1.13 Illinois

Definition

The State of Illinois (Title 35 Ill. Admin. Code (IAC) Part 807, 810 and Chapter 415 Illinois Compiled Statutes (ILCS) 20) does not define construction and demolition debris, however, 35 IAC 1100.103 does define clean construction or demolition debris (CCDD):

“means uncontaminated broken concrete without protruding metal bars, bricks, rock, stone, reclaimed or other asphalt pavement, or soil generated from construction or demolition activities. For purposes of this Part, CCDD may include uncontaminated broken concrete without protruding metal bars, bricks, rock, stone, or reclaimed or other asphalt pavement that has been painted (painted CCDD) if the painted CCDD is used as fill material at a CCDD fill operation in accordance with Section 1100. 212. Clean construction or demolition debris does not include uncontaminated soil generated during construction, remodeling, repair, and demolition of utilities, structures, and roads provided the uncontaminated soil is not commingled with any clean construction or demolition debris or other waste. For purposes of this Part, uncontaminated soil may include incidental amounts of stone, rock, gravel, roots, and other vegetation.”

It does not appear the land clearing debris is included in the definition of CCDD.

Exemptions

Beyond the exemptions included in the definition of CCDD, CCDD used as a fill below grade is not considered to be a waste as long as:

1. the filled area is not within the setback area of a drinking water well
2. within 30 days of filling, the CDD is covered

(<http://www.epa.state.il.us/land/ccdd/index.html>)

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Clean Construction and Demolition Debris (CCDD) Fill Operations – accept uncontaminated broken concrete, bricks, rock, stone, reclaimed asphalt pavement, and soil generated from CDD activities.
2. MSW Landfills

CDD Debris Disposal and Recycling Amounts

There is a monthly Clean Construction Demolition Debris form which tracks the daily quantity of material used for CCDD fill operations (<http://www.epa.state.il.us/land/regulatory-programs/permits-and-management/forms/clean-construction-demo-debris/index.html>). There is also a Solid Waste Management Fee form which all permitted landfills are required to complete on a quarterly basis. However, this form only requests the total quantity of materials received at the site. (<http://www.epa.state.il.us/land/forms/index.html#clean-construction-demo-debris>)

Solid waste disposal information is provided in annual landfill capacity reports, but these only provide total tonnages accepted. Therefore, the state's CDD disposal data category is 0.

Currently, CDD landfills do not exist in Illinois. Although inert waste landfills have provisions written into the regulations that address and may accept several types of CDD waste (i.e. bricks, masonry, concrete), there have not been any facilities permitted under the inert waste landfill classification. Therefore, CDD wastes that are not suitable for a CCDD fill operation are regulated as solid waste and are disposed of at an MSW landfills.

CDD Recycling data was not found on Illinois EPA's website – no information was located on annual tonnages of CCDD fill operations.

Resources

1. Illinois Regulations for CCDD Page
<http://www.epa.state.il.us/land/ccdd/index.html>
<http://www.ipcb.state.il.us/documents/dsweb/Get/Document-54435>
2. Annual Landfill Capacity Reports
<http://www.epa.state.il.us/land/landfill-capacity/index.html> – site total tonnage acceptance
(does not appear that CDD is separately tracked)

1.14 Indiana

Definition

The State of Indiana (329 I.A.C. 10-2-37) defines construction/demolition waste as:

“solid waste resulting from the construction, remodeling, repair, or demolition of structures. Such wastes may include any of the following:

1. *Scrap lumber*
2. *Bricks*
3. *Concrete*
4. *Stone*
5. *Glass*
6. *Wallboard*
7. *Roofing*
8. *Plumbing fixtures*
9. *Wiring*
10. *Nonasbestos insulation*

The term does not include the following types of regulated solid waste:

1. *Fluorescent light fixtures*
2. *Appliances*
3. *Regulated asbestos-containing material as defined in 40 CFR 61*
4. *Any other waste resulting from construction, remodeling, repair, or demolition of a structure that, when placed in the landfill, would potentially result in contamination of ground water or present a risk to human health or the environment.”*

Exemptions

Outside of the materials specifically listed as exclusions in the above definition, the state regulations exclude the following CDD debris from state solid waste landfill disposal regulations (as found in 329 I.A.C 10-3-1):

1. *Disposal of only uncontaminated rocks, bricks, concrete, road demolition waste materials, or dirt*
2. *Disposal of uncontaminated and untreated natural growth solid waste, including tree limbs, stumps, leaves, and grass clippings.*

Based on these exemptions, it appears that both the disposal of “clean fill” materials and land clearing debris or yard waste would be excluded from landfill disposal regulations and, therefore, from CDD reported quantities.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD Sites – construction/demolition waste must not be further shredded, crushed, ground, pulverized, or otherwise processed after construction/demolition or prior to disposal to a form unrecognizable as construction/demolition waste.

2. MSW Landfills
3. Large and Small Solid Waste Incinerators
4. Solid Waste Processing Facilities (which include transfer stations)

CDD Debris Disposal and Recycling Amounts

Quarterly reporting forms for both disposal and processing facilities require specification of the amount of CDD managed and its state and county of origin. According to Indiana Administrative Code, 329, Article 11, a transfer station is a solid waste processing facility. While the processing facility reporting form requires the tonnage and destination of wastes handled by the facility, it does not request information on the type of material exported – only the total tonnage. The state, therefore, only tracks the amount of total waste exported but does not appear to track amounts of CDD exported out of the state. Also, the amount of CDD recycled is not tracked. The forms specify a conversion factor for MSW to estimate mass quantities based on the waste's density, but they do not provide conversion factors for CDD debris (considered as non-municipal solid waste in the forms). (http://www.in.gov/idem/5157.htm#olq_sw)

Annual reports (available from 2000-2008) list the total amount (in-state+imported) of CDD disposed at both MSW landfills and CDD landfills. Also, information is provided on the total amount of out-of-state CDD disposed of at CDD landfills. However, the amount of CDD exported out of state is not reported as transfer stations are required only to track total amount of outgoing waste by destination and not by waste type. Assuming that the transfer station exported the same fraction of CDD as that of the total waste, less than 4% of CDD was exported out of the state. Only 2% of the total waste generated in the state was exported out of state (waste export was less than 10% of the imported amount).

Indiana CDD disposal is tracked at both MSW and CDD landfills, and quantities of imported CDD can also be well-approximated from annually reported waste management data. However, because CDD exports cannot be determined with certainty (though other data suggests that CDD exports would account for well below a 15% difference from the true CDD disposal tonnage) Indiana CDD disposal data quality category is a 2. It should be noted that the last annual report available online was from 2008.

Indiana does not provide information on the quantities of CDD diverted from disposal.

Resources

1. IDEM Summary of Solid Waste Facility Data Reports
<http://www.in.gov/idem/5070.htm>
2. Indiana Administrative Code, Title 329 (see Article 10 – Solid Waste Land Disposal Facilities)
<http://www.in.gov/legislative/iac/title329.html>

1.15 Iowa

Definition

The State of Iowa (Iowa Admin. Code 567-100.2) defines construction and demolition waste as:

“waste building materials including wood, metals and rubble which result from construction or demolition of structures. Such waste shall also include trees.”

Because the above definition includes trees, it appears that land clearing debris is included in the definition of CDD.

Iowa Admin. Code 567-108 defines fill material as:

“material that is used to raise the elevation of, take up space in, or build up the level of the land. for the purposes of this chapter, fill materials is not considered subbase for hard-surface road construction.”

Exemptions

Materials which are pre-approved for specific beneficial uses which does not require any further authorization from the department, in accordance with Iowa Admin. Code §567—108.6 and §567—108.7, include:

1. Asphalt shingles
2. Glass
3. Gypsum and gypsum wallboard
4. Rubble – uncontaminated concrete, brick, asphalt pavement, soil, and rock
5. Wood

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD Waste Disposal Sites – sanitary landfills that accept only CDD wastes
2. MSW Landfill – prohibits yard waste
3. Transfer Station

CDD Debris Disposal and Recycling Amounts

CDD and MSW landfills are required to report the tons of solid waste disposed at the landfill, on a quarterly basis (<http://www.iowadnr.gov/InsideDNR/RegulatoryLand/SolidWaste/SolidWastePermitting/Landfills.aspx>).

These reports do not provide the types of waste disposed of at different types of landfills. For example, the amount of CDD debris disposed of at a MSWLF is not provided. Therefore, the state's CDD disposal data category is 0.

CDD diversion information was not found.

Resources

1. Solid Waste Data, Landfill Tonnages
<http://www.iowadnr.gov/InsideDNR/RegulatoryLand/SolidWaste/TonnageData.aspx>
2. Iowa Code and Administrative Rules, Chapter 567-114: Sanitary Landfills – CDD Wastes

<http://www.iowadnr.gov/InsideDNR/RegulatoryLand/SolidWaste/SolidWastePolicyRules.aspx>

3. Chapter 567-113: Sanitary Landfills – Groundwater Protection Systems for the Disposal of Nonhazardous Wastes
<https://www.legis.iowa.gov/DOCS/ACO/IAC/LINC/Chapter.567.113.pdf>
4. Chapter 567-108: Beneficial Use Determinations
<https://www.legis.iowa.gov/DOCS/ACO/IAC/LINC/Chapter.567.108.pdf>
5. Chapter 567-106: Transfer Stations
<https://www.legis.iowa.gov/docs/ACO/chapter/567.106.pdf>

1.16 Kansas

Definition

The State of Kansas, in Kansas Statutes Annotated (KSA), Chapter 65, Article 34 – Solid Waste and Administrative Regulations, Article 29 – Solid Waste, construction and demolition waste means:

“solid waste resulting from the construction, remodeling, repair and demolition of structures, roads, sidewalks and utilities; untreated wood and untreated sawdust from any source; treated wood from construction or demolition projects; small amounts of municipal solid waste generated by the consumption of food and drinks at construction or demolition sites, including, but not limited to, cups, bags and bottles; furniture and appliances from which ozone depleting chlorofluorocarbons have been removed in accordance with the provisions of the federal clean air act; solid waste consisting of motor vehicle window glass; and solid waste consisting of vegetation from land clearing and grubbing, utility maintenance, and seasonal or storm-related cleanup. Such wastes include, but are not limited to, bricks, concrete and other masonry materials, roofing materials, soil, rock, wood, wood products, wall or floor coverings, plaster, drywall, plumbing fixtures, electrical wiring, electrical components containing no hazardous materials, nonasbestos insulation and construction related packaging. Construction and demolition waste shall not include waste material containing friable asbestos, garbage, furniture and appliances from which ozone depleting chlorofluorocarbons have not been removed in accordance with the provisions of the federal clean air act, electrical equipment containing hazardous materials, tires, drums and containers even though such wastes resulted from construction and demolition activities. Clean rubble that is mixed with other construction and demolition waste during demolition or transportation shall be considered to be construction and demolition waste.”

Based on the above definition, land clearing debris is considered CDD. It is also possible that yard waste, as “vegetation from seasonal cleanup” would also be considered CDD.

Clean rubble is considered construction and demolition waste under the following definition (found in the same location as the definition for CDD waste) where clean rubble:

“means the following types of construction and demolition waste: concrete and concrete products including reinforcing steel, asphalt pavement, brick, rock and uncontaminated soil as defined in rules and regulations adopted by the secretary.”

Exemptions

Section 65-3407.(a) appears to suggest that a permit is not required for construction of a clean rubble disposal facility.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD Landfills – does not include sites for the exclusive disposal of clean rubble
2. MSW Landfills
3. Monofills – clean rubble may be disposed of in any monofill
4. On-site disposal of demolition waste – demolition waste can be disposed of at the location of the previous building or structure
5. Solid Waste Processing Facility (includes transfer stations)

CDD Debris Disposal and Recycling Amounts

Kansas Department of Health and Environment (KDHE) reporting forms for both permitted landfills (which should include monofills according to KSA 65-3401(d)) and transfer stations require information on the quantity and origin of Kansas-disposed CDD material. In addition, transfer station forms require information on the tonnage and destination of CDD exported out-of-state. Quantity information is required in tons, and the landfill reporting form provides a conversion factor for CDD of 0.25 tons/cubic yard. The permitted landfills should submit the report on monthly or quarterly basis depending on waste acceptance rate.

(http://www.kdheks.gov/waste/about_swtonnagereporting.html – see links to forms and form instructions near the bottom of the page)

While the on-site disposal of demolition waste may occur without a permit, this type of waste management still requires the submission of an application which requests information on the quantity and location of placed materials. (See SWLF235 - http://www.kdheks.gov/waste/forms_swlf.html)

KDHE appears to compile the reported data into a publically available database (on KDHE's website), which provides the total annual tonnage of CDD disposed at Kansas landfills. A 2010 report shows that the quantity of imported CDD disposed of at Kansas landfills is approximately 5% of the total, and that CDD exports were far less than 1% of the total. (<http://www.kdheks.gov/waste/reportspublications/stateplan10.pdf>)

While reporting and application forms document the origin/destination and quantity of CDD materials managed by both transfer station, landfills and on-site disposal of demolition waste, because the contribution of CDD exports and imports is not clearly presented in the state-provided solid waste management database, the state's CDD disposal data category is a 2 considering that imports and exports appear to only slightly (~5% together) be contributing to the overall disposal quantities.

Kansas does not appear to publish information related to CDD recycling.

Resources

1. Kansas Solid Waste Database
<http://public1.kdhe.state.ks.us/Landfills/Landfills.nsf?Opendatabase>
2. Kansas Statutes Annotated, Chapter 65, Article 34 – Solid Waste and Administrative Regulations, Article 29 – Solid Waste
http://www.kdheks.gov/waste/regsstatutes/sw_laws.pdf

1.17 Kentucky

Definition

Kentucky Administrative Regulations (KAR) Title 401 Chapter 47 defines construction/demolition waste as:

“waste resulting from the construction, remodeling, repair, and demolition of structures and roads, and for the disposal of uncontaminated solid waste consisting of vegetation resulting from land clearing and grubbing, utility line maintenance, and seasonal and storm related cleanup.”

Furthermore, construction materials are separately defined as:

“nonhazardous nonsoluble material, including but not limited to steel, concrete, brick, asphalt roofing material, or lumber from a construction or demolition project. Mixture of construction and demolition debris with any amount of other types of waste may cause it to be classified as other than construction materials.”

Land clearing debris is included in CDD according to the above definition.

Exemptions

Under Kentucky Revised Statutes (KRS) 224.1-010, the following CDD debris is excluded from state solid waste regulations:

1. Sand
2. Soil
3. Rock
4. Gravel
5. Bridge debris
6. Recovered Material

According to the definition of recovered material (located in the same place as the other exemptions listed above), components of CDD recovered for recycling would be excluded from state solid waste regulations.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD Landfills
2. Permit by Rule CDD Landfills
3. Inert Landfills – construction materials, certain putrescible wood product wastes
4. Contained (MSW) Landfills
5. Residual Landfill – as approved only, case by case

CDD Debris Disposal and Recycling Amounts

There do not appear to be any forms that specifically require MSW IF CDD disposal quantity reporting - only industrial waste reporting. However, CDD landfills and Permit by Rule CDD landfills are required to quarterly report the CDD amount disposed.

(<http://waste.ky.gov/SWB/Pages/FormsandRegs.aspx>)

Kentucky Division of Waste Management Annual Reports were available for 2006-2013, but these did not include CDD disposal information – it appears this information is not available online. Annual

reports do not provide any details on the amount of CDD diverted from the waste stream. Therefore, the state's CDD disposal data category is 0.

Resources

1. Kentucky Revised Statutes
<http://www.lrc.ky.gov/statutes/chapter.aspx?id=42747>
2. Kentucky Administrative Regulations - Chapter 47: Solid Waste Facilities
<http://www.lrc.ky.gov/kar/title401.htm>
3. Kentucky Division of Waste Management Annual Reports
<http://dep.ky.gov/Pages/AnnualReports.aspx>

1.18 Louisiana

Definition

Louisiana Administrative Code (LAC) Title 33, Part VII, Subpart 1 defines construction and demolition debris as:

“nonhazardous waste generally considered not water-soluble that is produced in the process of construction, remodeling, repair, renovation, or demolition of structures, including buildings of all types (both residential and nonresidential). Solid waste that is not CDD debris (even if resulting from the construction, remodeling, repair, renovation, or demolition of structures) includes, but is not limited to, regulated asbestos-containing material (RACM) as defined in LAC 33:III.5151.B, white goods, creosote-treated lumber, and any other item not an integral part of the structure.”

Based on the above definition, it appears that land clearing debris is not included in the definition of CDD since it is “not an integral part of the structure”.

Land clearing debris is included under the definition of yard waste, which is:

“vegetative matter resulting from landscaping, maintenance, or land-clearing operations, including trees and shrubbery, leaves and limbs, stumps, grass clippings, and flowers.”

Exemptions

The state regulations (LAC Title 33, Part VII, Subpart 1, Section 303) exclude the following CDD debris, when processed or disposed in an environmentally sound manner, from being subject to permitting requirements and processing or disposal standards:

1. Brick, stone, concrete, asphaltic roadbeds
2. Woodwastes beneficially used in accordance with an approved BMP plan.
3. Solid wastes reused in a manner protective of human health and the environment

It should be noted that this section of the regulations also excludes wastes resulting from land-clearing and disposed of on the site where generated.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Type III Facilities – facilities (landfills, separation facility, composting facility) for disposing or processing of CDD debris, wood waste, and composting organic material
2. Type II Facilities – facilities for disposing residential and/or commercial solid waste
3. CDD debris disposal facilities that receive only in-site generated debris – are exempt from permitting
4. Beneficial Use Facilities
5. Transfer Station (Non-processing)
6. Incinerators

CDD Debris Disposal and Recycling Amounts

According to LAC Title 33, Part VII, Subpart 1, Section 303(F)(1)(d) all disposal and processing facilities must submit an annual report. An annual report form for disposal and beneficial use facilities was found which requires the tonnage of CDD waste accepted (there is also a blank for specifying waste type in the beneficial use form)

<http://www.deq.louisiana.gov/portal/DIVISIONS/WastePermits/SolidWastePermits.aspx>

Solid Waste Capacity Reports for 2009 and 2011 were found which have total CDD disposal information for the year (including the amount received by both CDD and municipal landfills), but it does not look like historic or updated CDD disposal information is regularly provided anywhere on the DEQ website and is not readily available. Therefore, the state's CDD disposal data category is 0.

CDD diversion information was not found on Louisiana Department of Environmental Quality's website.

Resources

1. Louisiana Administrative Code
<http://www.deq.louisiana.gov/portal/Portals/0/planning/regs/title33/33V07.pdf>
2. 2011 Solid Waste Capacity Report
<http://www.deq.louisiana.gov/portal/Portals/0/permits/sw/CapacityReport2011.docx>
3. 2009 Solid Waste Capacity Report
<http://www.deq.louisiana.gov/portal/portals/0/news/pdf/2009SolidWasteCapacityReport.pdf>

1.19 Maine

Definition

The State of Maine defines construction or demolition debris in Solid Waste Management Rules Chapter 400 as:

“solid waste resulting from construction, remodeling, repair, and demolition of structures. It includes but is not limited to: building materials, discarded furniture, asphalt, wall board, pipes, and metal conduits. It excludes: partially filled containers of glues, tars, solvents, resins, paints, or caulking compounds; friable asbestos; and other special wastes.”

Although land clearing debris (definition reproduced below) is not included in CDD definition is regulated by state solid waste regulations:

“Land clearing debris means solid wastes resulting from the clearing of land and consisting solely of brush, stumps, soil material, and rocks.”

Exemptions

In addition to the exemptions specifically mentioned in the definition, it appears that land clearing debris and other vegetative wastes are excluded from the definition since it focuses on structural wastes. The use of CDD constituents as inert fill appear to be exempt from solid waste regulations. Although the state regulates the beneficial use of solid waste, the following beneficial use activities are exempt from regulation under this chapter:

- A. *The beneficial use of chipped wood from trees, brush, and other plant material generated from land clearing or timber harvesting activities provided that the material is used for fill on the same parcel of land or right-of-way where the waste is generated and the total affected area is less than one (1) acre, or used for fuel, mulch or erosion control.*
- B. *The beneficial use of inert fill as fill, drainage material in construction projects or as a raw material in cement, concrete or asphalt production.*
- C. *The beneficial use of processed cured asphalt and soil material in paving material production, and road and parking lot construction and maintenance.*
- D. *The beneficial use of oil-contaminated soil material that has been stabilized with emulsified asphalt as a substitute for virgin aggregate in the production of asphalt pavement.*
- E. *The combustion or processing of secondary materials generated exclusively at a facility in that facility's lime kiln, cement kiln, bark and hogged fuel boiler, biomass or conventional fuel boiler, Kraft recovery boiler or sulfite process recovery boiler, and the combustion of wood wastes from land clearing or wood waste from wood products facilities at these facilities.*

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Construction/Demolition Landfills – there are two categories: small (less than 6 acres in size) or large (greater than 6 acres in size)

2. MSW Landfills
3. Land Clearing Debris & Wood Waste Landfills
4. Transfer Stations
5. Solid Waste Processing/Composting Facilities
6. Solid Waste Incineration Facilities

CDD Debris Disposal and Recycling Amounts

According to Maine Department of Environmental Protection (DEP) reporting forms, licensed transfer stations and landfill facilities (including MSW, CDD, LCD and Wood Waste landfills), processing facilities, and incineration facilities are all required to report the origin and (as applicable) destination of tonnages of CDD materials accepted/handled. According to Maine Solid Waste Management Rules, Chapter 400, all solid waste facilities must be licensed by DEP.

In addition, the state regulations require municipalities to report annually on their municipal solid waste management and recycling systems to the Maine DEP (38 MRSA §2133.7). In the DEP-licensed transfer station and landfill annual report form instructions, some CDD-type volume-to-weight conversion densities are listed including 0.625 tons/cubic yard for demolition debris, 0.2 tons/cubic yard for mixed bulky waste and 0.175 tons/cubic yard for wood waste. (<http://www.maine.gov/dep/waste/solidwaste/applicationforms/index.html>)

The Waste Generation and Disposal Capacity Report for Calendar Year 2011, provides the Maine-generated quantities of mixed CDD landfilled in-state, processed/disposed out-of-state, CDD processing residue, and beneficial use of processed CDD as fuel chip (pdf page 11). While the report is mainly focused on MSW disposal, information is also included for 19 non-MSW land disposal facilities (pdf pg 15).

Considering the level of CDD reporting detail required in licensed solid waste management facility and municipality reporting forms and the thorough level of detail included in the solid waste report suggests a data quality category of 3 for Maine CDD disposal data.

In the 2011 report, Maine provides state-generated CDD diversion data only in terms of processed CDD as fuel chip. However, previous reports provide the quantity of “CDD, other wastes recycled” which, based off other data provided in a Solid Waste Generation and Disposal Capacity Report from 2009 (see Table A, pdf page 17) appears to mostly be comprised of CDD-type wastes.

Resources

1. Maine DEP Reports to the Legislature
<http://www.maine.gov/dep/legislative/reports.html>
2. Maine Solid Waste Management Rules
<http://www.maine.gov/dep/waste/rules/index.html>

1.20 Maryland

Definition

The Code of Maryland Regulations (COMAR) 26.04.07.13 separately defines acceptable construction debris and demolition debris as the following:

“Acceptable construction debris is structural building materials including cement, concrete, bricks (excluding refractory type), lumber, plaster and plasterboard, insulation, shingles, floor, wall and ceiling tile, pipes, glass, wires, carpet, wallpaper, roofing, felt, or other structural fabrics. Paper or cardboard packaging, spacing, or building materials, provided that they do not exceed 10 percent by volume of the waste, may be accepted at the rubble landfill. Paint containers, caulk containers, or glaze containers are acceptable, provided that they are empty, and any residual material which is dried before acceptance at the rubble fill, and further provided that this waste category does not exceed 1 percent by volume of the waste accepted at the rubble landfill.

Acceptable demolition debris associated with the razing of buildings, roads, bridges, and other structures includes structural steel, concrete, bricks (excluding refractory type), lumber, plaster and plasterboard, insulation material, cement, shingles and roofing material, floor and wall tile, asphalt, pipes and wires, and other items physically attached to the structure, including appliances if they have been or will be compacted to their smallest practical volume.”

Exemptions

The same regulations also provide a list of unacceptable construction debris and demolition debris:

“Unacceptable construction debris includes commercial, domestic, or industrial wastes or byproducts, paint, tar or tar containers, caulking compounds, glazing compounds, paint thinner or other solvents or their containers, creosote or other preservatives or their containers, tile, paneling, or carpet cement or other adhesives, and other solid waste which may contain an unacceptable waste or substance as may be determined by the approving authority to be unacceptable. Unacceptable demolition debris includes industrial waste or byproducts, any waste materials contained within a structure or on the grounds of the structure being demolished that are not physically part of the structure, or which are comprised of or contain materials that pose an undue risk to public health or the environment.”

Although land clearing debris (LCD) is specifically not included in the definition of acceptable CDD, it is separately defined to include earthen material (such as clays, sands, gravels, and silts), topsoil, tree stumps, root mats, brush and limbs, logs, vegetation and rock.

The state regulations exempt “filling operations which consist solely of the importation of clean earthen fill containing rock, concrete, non-refractory brick, and asphalt created as a result of construction excavation activities, mining, or regrading projects” from solid waste permitting requirements under certain specific conditions (COMAR 26.04.07.04(C)(5)).

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Rubble Landfills
2. MSW Landfills
3. Solid Waste Processing Facilities
4. Solid Waste Transfer Stations
5. Non-hazardous Industrial Waste Landfills

6. Incinerator or Waste to Energy Facility
7. Land Clearing Debris Landfill (may only accept LCD)

CDD Debris Disposal and Recycling Amounts

All permitted solid waste acceptance facilities are required to complete an annual report detailing the quantity, origin, and (as applicable) destination and management of CDD received at their facility. The form specifically lists that yard waste and wood waste is not included in the CDD tracking category. Rather than providing guidance for conversion from volumetric to mass-based quantities, the form requests the conversion factor used if quantities are recorded in volumes. (http://www.mde.state.md.us/programs/Land/SolidWaste/AnnualTonnageReports/Pages/Programs/LandPrograms/Solid_Waste/tonnage_reports/index.aspx)

CDD management information is provided annually (and currently available in 2000-2012 reports). The 2012 Solid Waste Management and Diversion Report (for 2011 data) reiterates that all permitted waste acceptance facilities are required to provide waste acceptance information including tons of CDD managed by the facility (see pdf page 9). The report provides total CDD tonnage managed at permitted Maryland facilities and includes amounts imported and exported. As the disposal and recycling amounts of imported and exported CDD are not provided, the disposal and recycling amounts of state-generated CDD could not be calculated. However, based on the quantity of CDD imported as provided in the report (see pdf page 23), it appears that even if all imported CDD was included in the disposal number, the amount disposed would be overestimated by about 15%. Based on the first footnote of Table 3 and the column titles in Figure 3 (and data presented in Tables 1, 3 and 13), it appears that the reported values do include exported CDD.

While the state's annual reporting form requires all permitted waste management facilities to list the quantity and origin of CDD accepted, because the disposal tonnages reported appear to include up to a 15% disposal overestimate of state-generated CDD due to inclusion of imported CDD, the category level of Maryland CDD disposal data is a 2.

Although recycling amount may include imported CDD, the methodology for recycling amount estimation is based on estimation of recycled amount per processing facility and, therefore, the inclusion of imported amount does not impact the estimation.

LCD amounts are separately provided in the annual reports. As clean debris filling operations are exempted from solid waste regulations, the CDD amount used in filling operation probably are not tracked and reported to the state.

Resources

1. COMAR Title 26, Subtitle 4, Chapter 7 - Solid Waste Management
http://www.dsd.state.md.us/comar/SubtitleSearch.aspx?search=26.04.07.*
2. Maryland Solid Waste Management and Diversion Reports
<http://www.mde.state.md.us/programs/Land/RecyclingandOperationsprogram/Publications/Pages/Programs/LandPrograms/Recycling/publications/index.aspx>

1.21 Massachusetts

Definition

The Commonwealth of Massachusetts defines construction and demolition waste in 310 Code of Massachusetts (CMR) 19.006 as:

“the waste building materials and rubble resulting from the construction, remodeling, repair or demolition of buildings, pavements, roads or other structures. Construction and demolition waste includes but is not limited to, concrete, bricks, asphalt pavement, masonry, plaster, gypsum wallboard, metal, lumber and wood.”

Exemptions

While the above definition includes no specific exemptions, it does not include land clearing debris. The state bans disposal, incineration, and transfer for disposal of asphalt pavement, brick, concrete, clean gypsum wallboard and wood.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD Processing Facilities – processed prior to reuse, transport to a solid waste disposal facility, or other recovery facility.
2. Transfer Station
3. Landfills – CDD fines and residuals as cover, as well as disposed following waste processing (not banned materials)
4. Combustion Facilities – CDD may be disposed of as fuel following waste processing

CDD Debris Disposal and Recycling Amounts

Massachusetts Department of Environmental Protection (MassDEP) requires landfills and combustion facilities, handling facilities/transfer stations and CDD facilities (i.e., CDD processors and transfer stations) to annually report the amount and origin of materials accepted. In addition, handling facilities/transfer stations and CDD facilities are required to report the destination of materials handled. The instructions for filling out the landfill and combustion facility form lists a volume to weight conversion factor of 0.25 tons/cubic yard.

(<http://www.mass.gov/eea/agencies/massdep/recycle/approvals/solid-waste-applications-and-forms.html#8>)

It should be noted that there are no active CDD landfills in Massachusetts. (<http://www.mass.gov/eea/agencies/massdep/recycle/solid/landfills-transfer-stations-and-compost-sites.html>)

MassDEP provides annual Solid Waste Data Updates (currently available for 2005-2011) which provides CDD management information. Reports organize CDD management data in terms of generation, disposal, recycling and other diversion. The amount of different CDD constituents recycled are also tracked. The reports detail the amount of CDD wood used as fuel and track the quantities of imported and exported CDD. Due to the complete tracking of CDD at all facilities which may handle the material, and because both the import and export of CDD are documented and reported by MassDEP, the state's CDD disposal data category is a 3.

Resources

1. MassDEP Solid Waste Master Plan Progress Reports
(<http://www.mass.gov/eea/agencies/massdep/recycle/reports/solid-waste-master-plan.html>)

2. MassDEP 310 Code of Massachusetts Regulations Chapter 19 – Solid Waste Management
<http://www.mass.gov/eea/docs/dep/service/regulations/310cmr19.pdf>

1.22 Michigan

Definition

The State of Michigan defines construction and demolition waste in Michigan Administrative Code (MAC), R 299.4101 as:

“waste building materials, packaging, and rubble that results from construction, remodeling, repair, and demolition operations on houses, commercial or industrial buildings, and other structures. Construction and demolition waste includes trees and stumps which are more than 4 feet in length and 2 inches in diameter and which are removed from property during construction, maintenance, or repair. Construction and demolition waste does not include any of the following, even if it results from the construction, remodeling, repair, and demolition of structures:

- (i) Asbestos waste*
- (ii) Household waste*
- (iii) Corrugated containerboard*
- (iv) Appliances*
- (v) Drums and containers*
- (vi) Any aboveground or underground tank and associated piping, except septic tanks*
- (vii) Solid waste that results from any processing technique which renders individual waste components unrecognizable, such as pulverizing or shredding, unless the type and origin of such waste is known not to contain the wastes listed in (i) to (vi) of this subdivision.”*

It should be noted that the above definition includes at least a portion of land clearing debris.

Exemptions

Besides those exemptions listed in the definition, the state (MAC R 299.4114) conditionally exempts requirement of a construction permit or operating license for the use of inert material on land. Inert Materials are defined to include rock, land clearing debris buried at the site of generation, excavated soil, construction brick, masonry, pavement, broken concrete (used as fill, riprap, slope stabilization, or other construction).

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Type III – includes CDD Landfill and Industrial Waste Landfill
2. Type II - Municipal Solid Waste Landfills
3. Transfer Facility
4. Processing Plant
5. Incinerator

CDD Debris Disposal and Recycling Amounts

Section 11507a(1) of Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act (1994 PA 451) requires all landfills in Michigan to annually submit a report to the state and the county and municipality in which the landfill is located that contains information on the amount of solid waste received by the landfill during the year itemized, to the extent possible, by county, state, or country of origin and the amount of remaining disposal capacity at the landfill.

There is one form provided for reporting the origin and annual tonnages received at Type II and Type III disposal facilities – annual reporting forms/requirements for transfer facilities, processing plants and incinerators were not located in Michigan Statutes, MAC, or on Michigan Department of Environmental Quality's (MDEQ) website. This form specifically requests the tonnage of CDD materials accepted. It is not clear within this form what conversion factor Michigan DEQ used to convert tons to cubic yards for CDD.

CDD disposal information was reported separately from industrial waste starting in 2010 - each of the annual reports provides the volume (in cubic yards) of state-generated CDD which was disposed of in the state. As imported waste constituted over 20% of the total waste disposed of at the landfills in Michigan, it appears that the lower tipping fee in the state promotes waste imports into the state. However, information of CDD exports is not provided. Based on import amounts tracked by Indiana and Wisconsin, it appears less than 1% of the Michigan total waste was exported to these two states.

While the annual reports provide information of the total volume of state-generated CDD disposed at Michigan landfills, insufficient information is provided in order to estimate the amount of CDD exported from the state. As a result, the state's CDD disposal data category is a 1.

CDD recycling information for the state was not available on MDEQ's website.

Resources

1. Annual Reports of Solid Waste Landfilled in Michigan
<http://www.michigan.gov/deq/0,4561,7-135-3312-47581--,00.html>
2. Michigan Statutes, Natural Resources and Environmental Protection Act, Act 451 of 1994, Part 115 – Solid Waste Management
<http://www.legislature.mi.gov/documents/mcl/pdf/mcl-451-1994-ii-3-115.pdf>
3. MAC R 299 - Solid Waste Management
http://www7.dleg.state.mi.us/orr/Files/AdminCode/920_2008-028EQ_AdminCode.pdf

1.23 Minnesota

Definition

The State of Minnesota separately defines construction debris and demolition debris. Construction debris is defined under Minnesota Statutes (MS) Chapter 115A.03 as:

“waste building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition of buildings and roads.”

Demolition debris is defined under Minnesota Administrative Rules (MAR) Chapter 7035 as:

“solid waste resulting from the demolition of buildings, roads, and other structures including concrete, brick, bituminous concrete, untreated wood, masonry, glass, trees, rock, and plastic building parts. Demolition debris does not include asbestos wastes.”

It does not appear that land clearing debris is included in the definition of construction debris.

Exemptions

MAR 7035 excludes the following from the definition of solid waste:

1. earthen fill, boulders and rock

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Type II Disposal Facility – (includes sanitary landfills)
2. Type III Disposal Facility – accepts non-hazardous source-specific industrial process waste or construction debris (includes demolition landfills)
3. Transfer Facilities
4. Resource Recovery Facilities
5. Yard Waste Compost Facilities

Construction debris is not explicitly excluded from the definition of mixed municipal solid waste (Minnesota Statutes 115A.03 Subdivision 21).

CDD Debris Disposal and Recycling Amounts

According to MAR 7035.2585, all solid waste management facilities are required to report the quantity of each type of waste handled at the facility. It is unknown whether CDD amounts are specifically requested in annual reporting forms - solid waste management facility annual report forms are not available on the Minnesota Pollution Control Agency (MPCA) website because the state is transitioning to electronic reporting using RE-TRAC. However, there is an informational page discussing that the information required by RE-TRAC will be similar to the previous year's annual reporting requirements and will include reporting information on waste types, volumes, management methods and (where applicable) final destination.

<http://www.pca.state.mn.us/index.php/waste/waste-permits-and-rules/waste-permits-and-forms/solid-waste-permit-application-forms.html#annual>

According to the requirements of MAR, CDD disposal data quality could only be rated up to a 1 (as regulations explicitly requiring waste origin and destination information were not located). However, considering the information provided in the Re-TRAC informational page, it is possible that actual disposal data may have a higher data quality category if CDD imports and exports are also being

quantified. Total CDD disposal information is not published in biennial Solid Waste Policy Reports. Currently, because CDD disposal data is not available for review, the state's CDD disposal data category is 0.

CDD recycling data are not provided in the MPCA Recycling and MSW Disposal searchable database – it is possible that resource recovery facilities are not required to report the quantity of CDD materials diverted.

Resources

1. Minnesota Solid Waste Rules
<http://www.pca.state.mn.us/index.php/waste/waste-permits-and-rules/waste-rules/minnesota-rules-for-hazardous-waste-solid-waste-and-tanks.html>
2. Minnesota Waste Management Statues
<https://www.revisor.mn.gov/statutes/?id=115A>
3. MPCA Solid Waste Policy Reports
<http://www.pca.state.mn.us/index.php/waste/waste-and-cleanup/waste-management/solid-waste/integrated-solid-waste-management/solid-waste-policy-reports/index.html>
4. Minnesota Recycling and MSW Disposal Data
<http://www.pca.state.mn.us/index.php/data/score/recycling-and-solid-waste-data.html>

1.24 Mississippi

Definition

Mississippi Administrative Code (MAC) does not define construction and demolition waste. However, it does define “rubbish” which appears to include CDD – CDD is specifically mentioned as acceptable waste in Class I Rubbish Sites. 11 MAC Part 4, Chapter 1, Rule 1.1 (C)(89) defines rubbish as:

“nonputrescible solid wastes (excluding ashes) consisting of both combustible and noncombustible wastes. Combustible rubbish includes paper, rags, cartons, wood, furniture, rubber, plastics, yard trimmings, leaves and similar material. Noncombustible rubbish includes glass, crockery, metal cans, metal furniture and like material which will not burn at ordinary incinerator temperatures (not less than 1600 degrees F).”

Land clearing debris and yard waste appears to be included in the definition of rubbish. These vegetative wastes are both included in the state’s definition of yard waste, which is:

“the leaves, grass cuttings, weeds, garden waste, tree limbs, and other vegetative wastes generated at residential, commercial, institutional, governmental, or industrial properties.”

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations (See Rule 1.1(B)):

1. Rubbish that is legitimately used, reused, recycled or reclaimed, except for rubbish wastes which is composted or which, due to its chemical or physical constituency, would result in an endangerment to the environment or the public health, safety, or welfare.
2. Beneficial uses of solid wastes that have been determined by the Department to have physical and chemical qualities that make the wastes suitable for use as a replacement material for other raw materials or products. The Commission may adopt additional guidance or standards to evaluate such wastes for beneficial use.
3. Beneficial fill projects involving an area occupying less than one acre in size and for a duration of less than 120 days.
4. Solid wastes which do not constitute an endangerment to the environment or the public health, safety or welfare and which are disposed of on the same property on which wastes are generated.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Class I Rubbish Site – see below for accepted wastes
2. Class II Rubbish Site – see below for accepted wastes
3. MSW Landfills
4. Processing Facilities
5. Transfer Stations
6. Vegetative Debris and Untreated Wood Composting Facilities
7. Commercial Waste Incinerators

According to MAC 11-4-1-1.6(B), and (C):

Class I Rubbish Site may receive the following wastes for disposal:

- (1) construction and demolition debris, such as wood, metal, etc.
- (2) brick, mortar, concrete, stone, and asphalt
- (3) cardboard boxes
- (4) natural vegetation, such as tree limbs, stumps, and leaves.
- (5) appliances (other than refrigerators and air conditioners) which have had the motor removed
- (6) furniture
- (7) plastic, glass, crockery, and metal, except containers
- (8) sawdust, wood shavings, and wood chips
- (9) other similar wastes specifically approved by the Department.

Class II Rubbish Site may receive the following wastes for disposal:

- (1) natural vegetation, such as tree limbs, stumps, and leaves
- (2) brick, mortar, concrete, stone, and asphalt
- (3) other similar rubbish specifically approved by the Department.

CDD Debris Disposal and Recycling Amounts

Mississippi Department of Environmental Quality (DEQ) reporting forms for each of the facilities listed above were discovered except for Commercial Waste Incinerators – based on a review of the Calendar Year 2012 Status Report on Solid Waste Management Facilities and Activities, it does not appear that the quantity of waste materials managed by incineration is currently tracked. The rubbish landfills reporting form requires information on the origin and quantity of rubbish waste. MSW landfills, processing facilities and transfer stations are not required to separately report the amount of rubbish waste they accept. Vegetative Debris and Untreated Wood Composting Facilities are required to report the quantity and origin of materials they receive.

(http://www.deq.state.ms.us/Mdeq.nsf/page/SW_SolidWasteFacilitiesReportingProgram?OpenDocument)

While DEQ does not track the amount of Rubbish going into MSW LFs (19 total sites as of 2012), they do track the amount of out-of-state waste going into their Rubbish LFs (121 total sites as of 2012). Annual reports providing this information were located for 1997-2012. CDD exports (and total waste exports) are not being tracked and cannot be estimated, and because not all Mississippi disposal facilities which can accept CDD materials are tracking disposal data, the Mississippi CDD disposal data category is 0.

Mississippi CDD diversion data was not found on DEQ's website. Since processing facilities are not required to separately report the amount of CDD handled, it does not appear that CDD diversion data are being tracked by DEQ.

Resources

1. Solid Waste Facilities Reporting Files
http://www.deq.state.ms.us/Mdeq.nsf/page/SW_SolidWasteFacilitiesReportingProgram?OpenDocument
2. Mississippi Nonhazardous Solid Waste Management Rules
[http://www.deq.state.ms.us/mdeq.nsf/pdf/legal_11Miss.Admin.CodePt.4Ch.1./\\$File/11%20Miss.%20Admin.%20Code%20Pt.%204%20Ch.%201..pdf?OpenElement](http://www.deq.state.ms.us/mdeq.nsf/pdf/legal_11Miss.Admin.CodePt.4Ch.1./$File/11%20Miss.%20Admin.%20Code%20Pt.%204%20Ch.%201..pdf?OpenElement)

1.25 Missouri

Definition

Missouri Revised Statutes (MRS) 260.200 defines construction and demolition waste as:

“waste materials from the construction and demolition of residential, industrial, or commercial structures, but shall not include materials defined as clean fill under this section.”

Clean fill is defined as the following:

“uncontaminated soil, rock, sand, gravel, concrete, asphaltic concrete, cinderblocks, brick, minimal amounts of wood and metal, and inert solids as approved by rule or policy of the department for fill, reclamation or other beneficial use”

10 CSR 80-4.010(2)(A) explicitly states what materials may be accepted at a CDD landfill: demolition wastes, construction wastes, brush, wood wastes, cut, chipped, or shredded tires, inert plastics, soil, rock, concrete, sand, gravel, asphaltic concrete, cinder block and bricks.

It appears that “brush” may include land clearing debris.

Exemptions

Outside of materials used for clean fill, there appear to be no additional CDD materials exempted from solid waste regulations.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Demolition Landfills – demolition wastes, construction materials, brush, wood wastes, soil, rock, concrete, and inert solids
2. Sanitary (MSW) Landfill – demolition and construction wastes, brush and wood wastes, soil, rock, concrete, relatively inert solids
3. Processing Facility (includes transfer stations and incinerators)

CDD Debris Disposal and Recycling Amounts

According to reporting forms, only demolition landfills are specifically required to list the amount of CDD materials they accept onsite, where waste is categorized based on “general” and “heavy” in the form – the volume-to-weight conversion factors for each of these categories are 0.33 and 1.0 tons/cubic yard. (<http://www.dnr.mo.gov/forms/> - see Solid Waste section, Tonnage Fee Reporting)

After reviewing forms and regulations, it does not look like Missouri is required to track the CDD tonnages disposed of at their MSW LFs (22 sites). While Demolition LFs are reporting the tonnages they receive, there are only two of these sites. Also, transfer stations are only reporting the total tonnage handled. Therefore, the state’s CDD disposal data category is 0. CDD diversion information was not found.

Resources

1. Missouri Code of State Regulations
<http://www.sos.mo.gov/adrules/csr/current/10csr/10csr.asp#10-80>
2. Missouri Revised Statutes – Chapter 260 – Environmental Control
<http://www.moga.mo.gov/statutes/c260.htm>
3. Waste Tonnage Reports

<http://www.dnr.mo.gov/env/swmp/pubs-reports/tonnage.htm>

1.26 Montana

Definition

The Administrative Rules of Montana (ARM) 17.50.502(6) defines construction and demolition waste as:

“the waste building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition operations on pavements, houses, commercial buildings, and other structures, once municipal, household, commercial, and industrial wastes have been removed.”

Clean fill is defined as:

“soil, dirt, sand, gravel, rocks, and rebar-free concrete, emplaced free of charge to the person placing the fill, in order to adjust or create topographic irregularities for agricultural or construction purposes.”

In Montana, materials are grouped into waste groups. Group III wastes include wood waste and inert waste including unpainted brick, dirt, rock, concrete, brush, and untreated and unpainted lumber. Group IV wastes include construction and demolition wastes, and asphalt.

Exemptions

Clean fill is not regulated under ARM 17.50.

According to Montana Code Annotated (MCA) 75-10-203, “slash and forest debris regulated under laws administered by the department of natural resources and conservation” is excluded from the definition of solid waste.

Managing Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Class II Landfills – can accept Group II (MSW), Group III and Group IV wastes
2. Class III Landfills – can accept Group III wastes
3. Class IV Landfills – can accept Group III and Group IV wastes

Of the above three classifications, all facilities are required to report the amount of waste disposed on an annual basis. Facilities may report as annual tonnage or volume, using a conversion of 0.35 tons/yd³ for compacted yd³ or 0.15 tons/yd³ for uncompacted yd³. Waste amounts reported for Class IV landfills can be considered fully CDD debris.

CDD Debris Disposal and Recycling Amounts

While no annual reporting forms were located, annual license renewal applications for Class II, II and IV landfills require total disposal and out-of-state waste tonnage acceptance information. (<http://deq.mt.gov/solidwaste/landfills.mcp>)

Therefore, while Class III and Class IV tonnages could be considered CDD, Class II landfills are not separately tracking the quantity of CDD which they dispose. Therefore, the state’s CDD disposal data category is 0.

Montana does not separately report the quantity of CDD or individual waste groups disposed/diverted in their Recycling and Waste Diversion Summaries.

Resources

1. Title 75, Chapter 10 – Waste and Litter Control
http://leg.mt.gov/bills/mca_toc/75_10.htm
2. Administrative Rules of Montana (see Sub-chapter 5)
<http://deq.mt.gov/SolidWaste/LawsRules.mcpX>
3. 2010 – 2012 Recycling and Waste Diversion Summaries
<http://deq.mt.gov/solidwaste/default.mcpX>

1.27 Nebraska

Definition

The State of Nebraska (132 Neb. Admin. Code, ch. 1, §021) defines construction and demolition waste as:

“waste which results from land clearing, the demolition of buildings, roads or other structures, including, but not limited to, fill materials, wood (including painted and treated wood), land clearing debris other than yard waste, wall coverings (including wall paper, paneling and tile), drywall, plaster, non-asbestos insulation, roofing shingles and other roof coverings, plumbing fixtures, glass, plastic, carpeting, electrical wiring, pipe and metals. Such waste shall also include the above listed types of waste that result from construction projects. Construction and demolition waste shall not include friable asbestos waste, special waste, liquid waste, hazardous waste and waste that contains polychlorinated biphenyl (PCB), putrescible waste, household waste, industrial solid waste, corrugated cardboard, appliances, tires, drums, and fuel tanks.”

Based on the above definition, land clearing debris is included in the definition of CDD.

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulation permit requirements (132 Neb. Admin. Code, ch. 2, §002.01):

1. The use of fill for the purpose of erosion control, erosion repair, channel stabilization, landscaping, roadbed preparation or other land improvement;
2. The disposal or use of trees and bush
3. The deposition of on-farm building demolition waste generated by an individual and disposed on location if such location is agricultural in nature

Based on the above exemptions, it appears that some types of structural fill would be exempt from permitting requirements.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD Waste Disposal Area
2. MSW Landfill
3. Solid Waste Transfer Station

CDD Debris Disposal and Recycling Amounts

Annual reporting forms for solid waste disposal and management facilities were not found on Nebraska Department of Environmental Quality's website. The state regulations do not appear to require facilities to report CDD disposal and recycled amounts. Therefore, the state's CDD disposal data category is 0.

Resources

1. NDEQ Integrated Solid Waste Management Regulations
<http://www.deq.state.ne.us/RuleAndRnsf/pages/132-TOC>
2. Construction and Demolition Waste in Nebraska

<http://www.deq.state.ne.us/Publica.nsf/0f7156e3c162d76f86256873005953ad/89e0f561638367de86257538005487f7!OpenDocument>

3. List of Permitted CDD Waste Landfills

<http://www.deq.state.ne.us/IntList.nsf/Web%20List!OpenView&Start=1&Count=125&Expand=2#2>

1.28 Nevada

Definition

Nevada includes CDD as a part of the definition for industrial solid waste, which according to Nevada Administrative Code (NAC) 444.585, includes the following:

”’Industrial solid waste’ means solid waste derived from industrial or manufacturing processes, including, but not limited to, the solid waste generated by the...

(p) Construction, refurbishing or demolition of buildings or other structures.”

Exemptions

No CDD or CDD material exemptions from solid waste, industrial waste, or exclusions based on beneficial use were identified in NAC or Nevada Revised Statutes (NRS).

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. Class I Sites (MSW LFs)
2. Class II Sites (<20 TPD MSW LFs)
3. Class III Sites (Industrial Solid Waste)

According to Nevada regulations, transfer stations and material recovery facilities do not require a permit, only an approval. (<http://ndep.nv.gov/bwm/swpermit.htm>)

CDD Debris Disposal and Recycling Amounts

According to Nevada Division of Environmental Protection (NDEP) facility reporting forms, Class I and Class II sites are required to track the quantity of CDD received, but Class III sites must fill in a blank for the type of waste(s) received and then provide individual quantities. The origin of CDD is not tracked for Class I and II facilities. Reporting requirements/forms for transfer stations were not found in Nevada Administrative Code (444.666), NRS or anywhere on NDEP’s website. The conversion factor to adjust disposed quantities from cubic yards is 0.55 tons/cubic yard (<http://ndep.nv.gov/bwm/forms.htm>)

A material recovery facility recycling annual reporting form was found which requests the amounts of CDD materials (in tons) recycled by the facility (<http://nevadarecycles.nv.gov/Resources/Data/> - see Form B). NAC 444A.135 specifies that all recycling centers located in municipalities with NDEP-approved recycling programs (i.e., counties with population of more than 45,000) must annually report recycled quantities to the municipality in which they are located on an NDEP-approved form. In addition, counties and health district with a population of more than 45,000 are also required to provide an annual report documenting recycled amount of different waste including CDD; provisions are specified to avoid double-counting of CDD amounts recycled. The five counties that submit this annual report represent over 90% of the state population.

Biennially-reported industrial and special waste disposed of in Nevada is provided for 2008-2011. The reports mention that CDD typically makes up about 90% of the waste in the industrial and special waste category – reported industrial and special waste disposal tonnages were multiplied by 0.9 to adjust for this consideration.

While it appears that all Nevada disposal facilities which can accept CDD are tracking quantity data, because of the unknown contribution of export and imports to the reported Nevada-disposed CDD tonnages, the state's CDD disposal data category is a 1. Only MSW imported amounts are reported in the biennial report.

Recycled CDD quantities by individual CDD constituents for Nevada are available for 2012 in a table provided in the same location as the biennial reports. Although recycling amount may include imported CDD, the methodology for recycling amount estimation is based on estimation of recycled amount per processing facility and, therefore, the inclusion of imported amount does not impact the estimation.

Resources

1. NDEP Biennial Recycling and Waste Reduction Reports
<http://nevadarecycles.nv.gov/Resources/Data/>
2. Nevada Administrative Code Chapter 444 – Sanitation
<http://www.leg.state.nv.us/NAC/NAC-444.html#NAC444Sec666>
3. Nevada Revised Statutes Chapter 444 – Sanitation
<http://www.leg.state.nv.us/nrs/nrs-444.htm#NRS444Sec440>

1.29 New Hampshire

Definition

The state of New Hampshire defines CDD debris and inert construction and demolition debris within Chapter Env-Sw 100 of the New Hampshire Code of Administrative Rules as follows:

Env-Sw 102.42 “Construction and demolition debris” means non-putrescible waste building materials and rubble which is solid waste resulting from the construction, remodeling, repair or demolition of structures or roads. The term includes, but is not limited to, bricks, concrete and other masonry materials, wood, wall coverings, plaster, dry wall, plumbing, fixtures, non-asbestos insulation or roofing shingles, asphaltic pavement, glass, plastics that are not sealed in a manner that conceals other wastes and electrical wiring and components, incidental to any of the above and containing no hazardous liquid or metals. The term does not include asbestos waste, garbage, corrugated container board, electrical fixtures containing hazardous liquids such as fluorescent light ballasts or transformers, furniture, appliances, tires, drums and containers, and fuel tanks.

Env-Sw 103.26 states “Inert construction and demolition debris” means construction and demolition debris which is comprised of materials that do not degrade, combust or generate leachate.

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations:

1. Waste-derived products which are certified for distribution and use pursuant to Env-Sw 1500 and actively managed. Env-Sw 104.61 *“Waste-derived product” means a material or item which is produced, in whole or in part, using materials or items which are recovered or diverted from the solid waste stream.”*
2. Cut or uprooted tree stumps buried on-site, with certain restrictions

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. Construction and demolition debris (CDD) landfills.
2. MSW Landfills
3. Transfer Station
4. Incinerator
5. Processing/Treatment Facility
6. Recycling Facility

On-site Asphalt and Masonry Debris Landfills and Off-site Stump Dumps contain CDD type materials, however these facilities are exempt from permitting requirements. Permits are also not required for managing virgin wood by above ground methods not including composting; and to collect, store, transfer, process, treat, or dispose of waste concrete, cement, brick, other inert masonry materials or bituminous concrete if specific conditions are met.

CDD Debris Disposal and Recycling Amounts

Within the state solid waste rules (Env-Sw) CDD landfills (Env-Sw 806.10) are required to file quarterly and annual reports. Quarterly reports require the quantity and type of waste accepted (in tons) by the facility daily with monthly and quarterly totals reported (Env-Sw 806.08(g) <http://1.usa.gov/L9Dxge>). Annual reporting forms were found for operating landfills and transfer stations which request information on the origin, quantity and (if applicable) destination of CDD handled including whether it was shipped out-of-state.

(<http://des.nh.gov/organization/divisions/waste/swmb/css/index.htm>)

Additional information was found on the Environmental Services Forms/Application webpage (<http://1.usa.gov/Mg7dsV>) including a *Volume to Weight Conversion Table* with CDD and clean fill materials listed. The following conversion factors were provided: concrete 860 lb/yd³; asphalt paving 773 lb/yd³; brick, ceramic, porcelain 860 lb/yd³; roofing 731 lb/yd³; wood 169 lb/yd³.

At the Solid Waste Facility Permitting website under the Publications section there is a heading for an Annual Report to the Legislature (<http://1.usa.gov/1msu4h>). It is unclear if these reports have continued to be produced however because the most recent version of this report found has 2007 data. This single 2008 report describes solid waste generation within New Hampshire and provides CDD waste for 2003-2007 with the 2007 mass totals of CDD managed (<http://1.usa.gov/Mvxowo>).

Because CDD appears to be tracked at all permitted landfill disposal facilities which may accept CDD, and because it appears CDD imports and exports are also tracked at transfer facilities, New Hampshire CDD disposal data quality, if available, would likely be categorized as a 3. However, because this data was not found (except for 2007) and is not readily available, the state's CDD disposal data category is currently 0.

CDD recycling/diversion information was not found, and CDD is not one of the categories of materials that is specifically listed on Recycling Annual Report Forms. It appears that this form is specifically designed for MSW recycling facilities.

Resources

1. Department of Environmental Services Rules/Regulatory website <http://1.usa.gov/1jRhbR>
2. Solid Waste Rules <http://bit.ly/1iaU9Aj>
3. Department of Environmental Services <http://1.usa.gov/1hR2DvO>
4. New Hampshire Solid Waste Report to the Legislature 2007
<http://des.nh.gov/organization/commissioner/pip/publications/wmd/documents/r-wmd-08-3.pdf>

1.30 New Jersey

Definition

New Jersey Administrative Code (NJAC) 7:26-1.4 defines construction and demolition waste (Type 13C) as:

“waste building material and rubble resulting from construction, remodeling, repair, and demolition operations on houses, commercial buildings, pavements, and other structures. This includes wastes such as treated and untreated wood scrap, tree parts, tree stumps and brush, concrete, asphalt, bricks, blocks and other masonry, plaster and wallboard, roofing materials, corrugated cardboard and miscellaneous paper, ferrous and non-ferrous metal, plastic scrap, dirt, carpets and padding; glass (window and door), non-asbestos building insulation, and other miscellaneous materials.”

Based on the above definition, land clearing debris is included in the definition of CDD. Bulky waste (Type 13) is also defined as including items such as:

“tree trunks, auto bodies, demolition or construction materials, appliances, furniture, and drums.”

The term Clean Fill is also used, meaning:

“uncontaminated nonwater-soluble, nondecomposable, inert solid such as rock, soil, gravel, concrete, glass and/or clay or ceramic products and does not include processed or unprocessed mixed construction and demolition debris, including, but not limited to, wallboard, plastic, wood or metal. The non-water soluble, nondecomposable inert products generated from an approved Class B recycling facility are considered clean fill.”

Exemptions

The definition for beneficial use appears to apply to the use of clean fill or land clearing debris, as provided in NJAC 7:26A-1.1, where the beneficial use of a material is not considered disposal or recycling:

“the use or reuse of a material, which would otherwise become solid waste, as landfill cover, aggregate substitute, fuel substitute or fill material or the use or reuse in a manufacturing process to make a product or as an effective substitute for a commercial product. Beneficial use of a material shall not constitute recycling or disposal.”

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. Transfer Stations
2. Material Recovery Facilities
3. Class I (MSW) Sanitary Landfills
4. Class III (Bulky and Vegetative Waste) Sanitary Landfills
5. Incinerator/Resource Recovery Facility

CDD Debris Disposal and Recycling Amounts

NJAC 7:26 – 2.13(e) requires all solid waste facilities to provide a monthly report detailing the CDD amounts received, and (if applicable) disposed and recovered. The form also requires specification of the origin of CDD and the destination of disposed CDD. Therefore, it appears that CDD disposal is being tracked for every facility which may accept CDD.

<http://www.state.nj.us/dep/dshw/resource/forms.htm>

Also, because the origin and final disposal destination of all CDD is also tracked, it appears that all CDD imports and exports are also being tracked by the state. Therefore, according to data tracking requirements as presented in both regulations and annual reporting forms, it appears that CDD disposal data quality may be a 3 on the data quality index. However, because this information was not found in any reports and is not readily available, the state's CDD disposal data category is 0.

Class B Recycling Facilities are required to annually report the quantity of individual CDD materials recovered including ID 17 (trees, tree parts, brush and stumps), ID 22 (asphalt, concrete, asphalt roofing and brick and block) and ID 30 (wood scrap) materials. Therefore, recycling tonnage data quality should be high.

Resources

1. New Jersey Administrative Code – Title 7, Chapter 26 – Solid Waste
<http://www.nj.gov/dep/dshw/resource/rules.html>
2. New Jersey Generation, Disposal and Recycling Statistics
<http://www.state.nj.us/dep/dshw/recycling/stats.htm>

1.31 New Mexico

Definition

The Solid Waste Act of New Mexico Statutes Annotated (NMSA) 1978 74-9-3 defines construction and demolition debris as

“materials generally considered to be not water soluble and nonhazardous in nature, including, but not limited to, steel, glass, brick, concrete, asphalt roofing materials, pipe, gypsum wallboard and lumber from the construction or destruction of a structure as part of a construction or demolition project, and includes rocks, soil, tree remains, trees and other vegetative matter that normally results from land clearing or land development operations for a construction project, but if construction and demolition debris is mixed with any other types of solid waste, whether or not originating from the construction project, it loses its classification as construction and demolition debris.”

In addition, most of the constituents that are included in the definition of clean fill (definition reproduced below) are typical constituents of CDD.

“Clean fill means broken concrete, brick, rock, stone, glass, reclaimed asphalt pavement, or soil that is uncontaminated, meaning the fill has not been mixed with any waste other than the foregoing and has not been subjected to any known spill or release of chemical contaminants, including petroleum product, nor treated to remediate such contamination; reinforcement materials which are an integral part, such as rebar, may be included as clean fill; clean fill must be free of other solid waste, to include land clearing debris, construction and demolition debris, municipal solid waste, radioactive waste, hazardous waste or special waste.”

Exemptions

The only exemptions specifically included in the legislated definition include CDD which is mixed with other types of solid waste. It should be noted that land clearing debris is included in the definition. The clean fill management facilities are not classified as solid waste facilities.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Construction and Demolition Landfill: A landfill that receives only CDD debris in quantities equal to or less than 50 tpd on a monthly average.
2. Municipal landfills: Any landfill that receives more than 50 tpd monthly average of CDD debris waste in any month is defined as a municipal landfill. CDD debris is also disposed with MSW in municipal landfills.
3. Recycling facility: a facility that collects, transfers, or processes recyclable materials for recycling, but does not include a composting facility.
4. Composting facility: a facility, other than a transformation facility, that is capable of providing biological stabilization of organic material.

CDD Debris Disposal and Recycling Amounts

The Solid Waste Management Rules in New Mexico Administrative Code (NMAC) 20.9.5.16 requires the owners and operators of solid waste facilities to submit an annual report which details the type, quantity, origin and disposition of materials. There is a common annual reporting form for landfill, recycling, composting and transfer/convenience center facilities to report the tonnage of CDD and clean fill. The waste origin (in-state or out-of-state), how it was managed on-site and off-

site; and which facility the waste was sent to is recorded. Numerous volume-to-weight conversion factors are provided. However, a conversion factor for mixed CDD is not provided.

(<http://www.nmenv.state.nm.us/swb/AnnualReportsandForms.htm>).

Annual reports provide CDD generation tonnage data under a section titled “solid waste generation and management in New Mexico”. Furthermore, CDD tonnages for out-of-state waste are separately provided. As all facilities which manage CDD are required to report the origin (if applicable) and destination of CDD, the state appears to track imported and exported CDD amounts. Although the CDD disposal and recycled amounts are not provided in the annual report, the state appears to compile this information. The US EPA did not contact the state to confirm the availability of the statewide CDD disposal and recycling data. As the clean fill management facilities are not classified as solid waste facilities, these facilities probably are not required to report the amount of clean fill managed. The clean fill amount compiled by the state (based on annual reports by solid waste facilities annual reports) may not represent the entire amount generated and managed in the state.

Considering that all CDD disposal and management facilities are required to report CDD disposal and recycling quantities and the origin and destination of CDD, the data category of New Mexico CDD management information is tracked at a high level of detail and the CDD disposal category would be a 3 if disposal information was separately provided. However, CDD disposal information currently cannot be disaggregated as presented in annual reports. Therefore, the state’s CDD disposal data category is currently 0.

Resources

1. Solid Waste Act and Solid Waste Management Rules
<http://www.nmenv.state.nm.us/swb/CurrentRules.htm>
2. Recent Solid Waste Facility Annual Reports Sent to the Legislature
<http://www.nmenv.state.nm.us/swb/AnnualReportsandForms.htm>

1.32 New York

Definition

The state of New York defines CDD debris in Regulations, Chapter IV, Subchapter B, Part 360-1.2(b)(38) as (<http://www.dec.ny.gov/regs/4415.html#14635>) :

“uncontaminated solid waste resulting from the construction, remodeling, repair, and demolition of utilities, structures and roads; and uncontaminated solid waste resulting from land clearing. Such waste includes, but is not limited to bricks, concrete and other masonry materials, soil, rock, wood (including painted, treated and coated wood and wood products), land clearing debris, wall coverings, plaster, drywall, plumbing fixtures, nonasbestos insulation, roofing shingles and other roof coverings, asphaltic pavement, glass, plastics that are not sealed in a manner that conceals other wastes, empty buckets 10 gal or less in size and having no more than 1 in. of residue remaining on the bottom, electrical wiring and components containing no hazardous liquids, pipe, and metals that are incidental to any of the above. Land clearing debris is vegetative matter, soil, and rock resulting from activities such as land clearing and grubbing, utility line maintenance or seasonal or storm-related cleanup such as trees, stumps, brush and leaves and including wood chips generated from these materials.”

According to the definition of CDD, it appears that land clearing debris and yard waste (as “seasonal cleanup”) are considered CDD materials.

The state provides the definition of land clearing debris as:

“means vegetative matter, soil and rock resulting from activities such as land clearing and grubbing, utility line maintenance or seasonal or storm-related cleanup such as trees, stumps, brush and leaves and including wood chips generated from these materials. Land clearing debris does not include yard waste which has been collected at the curbside”

In Long Island, the definition of clean fill is:

“means material consisting of concrete, steel, wood, sand, dirt, soil, glass, construction and demolition debris, and other recognizable inert material designated by the department.”

Exemptions

State Regulations, Chapter IV – Quality Services, 360 – Construction and Demolition Debris Landfills, states under Section 7.1 that (<http://www.dec.ny.gov/regs/2491.html>):

“(b) *Exemptions.*

(1) The following facilities are exempt from the permit requirements of this Part provided the facilities operate only between the hours of sunrise and sunset, and (if the allowable waste comes from an off-site source) no fee or other form of consideration is required for the privilege of using the facility for disposal purposes:

(i) A site at which only the following CDD debris is placed: recognizable uncontaminated concrete and concrete products (including steel or fiberglass reinforcing rods that are embedded in the concrete), asphalt pavement, brick, glass, soil and rock.

(ii) A landfill for the disposal of trees, stumps, yard waste and wood chips generated from these materials is exempt when origin and disposal of such waste occur on properties under the same ownership or control.

(iii) A CDD debris landfill is exempt if it meets the requirements of section 809 of the Adirondack Park Agency Act and is under the jurisdiction of, and constructed and operated pursuant to, a permit issued by the Adirondack Park Agency....

(2) A landfill that falls under the jurisdiction and is located on the property of either the New York State Thruway Authority (TA) or the New York State Department of Transportation (DOT) is exempt from regulation under this Part if it meets the specifications contained in a memorandum of understanding executed by the TA and the department or the DOT and the department. Until such memoranda are executed, the TA and DOT must comply with the requirements of this Part."

The state of New York provides the following exclusions from the definition of CDD debris in Regulations 360-1.2(b)(38) (<http://www.dec.ny.gov/regs/4415.html#14635>) :

"Solid waste that is not CDD debris (even if resulting from the construction, remodeling, repair and demolition of utilities, structures and roads and land clearing) includes, but is not limited to asbestos waste, garbage, corrugated container board, electrical fixtures containing hazardous liquids such as fluorescent light ballasts or transformers, fluorescent lights, carpeting, furniture, appliances, tires, drums, containers greater than ten gallons in size, any containers having more than one inch of residue remaining on the bottom and fuel tanks. Specifically excluded from the definition of construction and demolition debris is solid waste (including what otherwise would be construction and demolition debris) resulting from any processing technique, other than that employed at a department-approved CDD debris processing facility, that renders individual waste components unrecognizable, such as pulverizing or shredding. Also, waste contained in an illegal disposal site may be considered CDD debris if the department determines that such waste is similar in nature and content to CDD debris" .

State Regulation 360-1.2(a)(4)(vii) excludes the following from the definition of solid waste (<http://www.dec.ny.gov/regs/4415.html#14635>):

"discarded materials that the department has determined are being beneficially used..."

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Land Clearing Debris Landfill (regulated under CDD Landfill section)
2. CDD Landfill
3. Source-separated organics waste processing facilities: accepts yard waste
4. CDD Processing Facility
5. Transfer Station
6. Municipal Waste Combustion Facility
7. Municipal Solid Waste Landfill
8. Long Island Landfill

CDD Debris Disposal and Recycling Amounts

According to Regulations Chapter IV, Subchapter B, Part 360, all landfills (except those exempt as listed above), transfer stations, CDD processing facilities, and incineration facilities are required to submit an annual report detailing operating information of the facility. While specific rules regarding annual reporting by Source Separated Organics Processing Facilities were not found, an annual submission form was located as discussed below.

Facilities that process and dispose of CDD debris are required to fill out and submit an annual report form. Forms specify a volume-to-weight conversion factor of 0.75 tons/yd³ to allow facilities that do not use scales to report data in terms of tons.

Annual reporting forms were found for the following facility types which may accept some portion of CDD:

1. CDD Landfill
2. CDD Processing Facility
3. Land Clearing Debris Landfill
4. Municipal Waste Combustion Facility
5. Transfer Station
6. Source Separated Organics Processing Facility (yard waste)
7. Long Island Landfill
8. Landfill (Municipal Solid Waste, Industrial or Ash)

All of the forms for these facilities request information regarding the origin, quantity and (if applicable) destination of CDD which arrive at/leave their facility.

<http://www.dec.ny.gov/chemical/52706.html>

It appears the state extensively tracks CDD disposal and recycling amount for all the facilities that may receive CDD. As the historical data are not readily available on New York Department of Conservation's website, the data were not used for correlations. However, because of the extensive tracking of CDD at all sites which may accept CDD for disposal, and because it appears that all CDD imports and exports are also tracked, New York would be a 3 on the CDD disposal data category list if CDD disposal information was readily available. However, because this data is not currently available, the state's CDD disposal data category is currently 0.

Regularly updated CDD diversion information was not found on New York Department of Environmental Conservation's website.

Resources

1. New York Regulations Chapter IV – Quality Services
<http://www.dec.ny.gov/regs/2491.html>

1.33 North Carolina

Definition

In the state of North Carolina, as defined within the North Carolina Administrative Code 15A NCAC 13B.0532(8), CDD solid waste

“means solid waste generated solely from the construction, remodeling, repair, or demolition operations on pavement and buildings or structures. CDD waste does not include municipal and industrial wastes that may be generated by the on-going operations at buildings or structures.”

Exemptions

The state regulations exclude the following CDD debris from requiring a solid waste permit when managed appropriately as:

1. Inert debris as beneficial fill limited to concrete, brick, concrete block, uncontaminated soil, rock and gravel

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. Construction and demolition debris landfill (CDDLf)
2. Land clearing and inert debris landfill (LCID): these facilities can be permitted or not require a permit depending on the size, quantity of materials accepted, and other provisions. These facilities accept land clearing waste, concrete, brick, concrete block, uncontaminated soil, gravel and rock, untreated and unpainted wood, and yard trash.
3. Municipal solid waste landfill facility (MSWLF): it is unclear if CDD can be accepted, however there were no provisions suggesting that CDD cannot be accepted.
4. Treatment and processing facilities (if permit includes CDD debris as a managed waste)
5. Transfer facilities (if permit includes CDD debris as a managed waste)

CDD Debris Disposal and Recycling Amounts

It is prescribed by G.S. 130A-309.09D(b) (North Carolina General Statutes <http://bit.ly/1e7Y2qu>) that privately owned solid waste management facilities annually report to the Department the previous year's amount by weight of the solid waste that was received at the facility and disposed of in a landfill, incinerated, or converted to fuel. There are annual reporting forms for each type of solid waste management facility (Local Government and Solid Waste Facility Reporting <http://bit.ly/1jJfEyb>). Forms for incineration facilities and processing facilities request information on additional waste related activities and the types of materials accepted at a facility as part of recycling/reuse collection (e.g., concrete/rubble/asphalt, glass, other metal, gypsum/drywall). Weights are to be reported by county and state of origin. Annual data are compiled by the Division of Waste Management and posted online within folders by fiscal year. Tip fees for each county are reported based on facility primary waste type and are also available (Solid Waste Management Annual Reports <http://bit.ly/LoSU5a>). However, because it does not appear that annual reporting forms require all landfill facilities (e.g. MSWLF, LCID) to separately track CDD disposal amounts, the state's CDD disposal data category is 0.

Resources

1. Solid Waste Management Rules website <http://bit.ly/1byexq1>
2. Solid Waste Section website <http://bit.ly/1dNVlrv>

3. North Carolina General Statutes <http://bit.ly/1e7Y2qu>

1.34 North Dakota

Definition

In the state of North Dakota CDD is not defined, however within North Dakota Administrative Code Solid Waste Management and Land Protection NDAC §33-20-01.1-03(26), inert waste:

“means nonputrescible solid waste which will not generally contaminate water or form a contaminated leachate. Inert waste does not serve as food for vectors. Inert waste includes, but is not limited to: construction and demolition material such as metal, wood, bricks, masonry and cement concrete; asphalt concrete; metal; tree branches; bottom ash from coal fired boilers; and waste coal fines from air pollution control equipment.”

Exemptions

CDD wastes were not found to be explicitly excluded from the solid waste regulations. However, regulation of the beneficial use or reuse of materials, substances, energy, or other products derived from a resource recovery activity does not apply under the Solid Waste Management and Land Protection Article (33-20-01.1-02.1.e. <http://1.usa.gov/1fnDMjo>). Thus, it is possible for a CDD waste to be excluded from solid waste regulations if it was to be used beneficially.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. Inert waste landfills (these facilities can be standard or permitted by rule)
2. Municipal Solid Waste Landfills
3. Transfer Stations
4. Wood Processing Recycling Facility
5. Incinerators

Permit by rule facilities (NDAC §33-20-02.1-02) are described as facilities for inert waste serving municipalities with fewer than 1,000 people, contingent on the restrictions outlined in the section.

CDD Debris Disposal and Recycling Amounts

Within the state rules 33-20-04.1-04 (General Performance Standards <http://1.usa.gov/1JcOpM>), recordkeeping and reporting of non-permitted by rule solid waste management facilities is prescribed and would apply to inert waste landfills as well as municipal waste landfills. Annually, the quantity of each category of solid waste, reported in tons or volume, must be submitted (33-20-04.1-04.3.c.). Forms for annual reporting for inert waste landfills and municipal solid waste landfills were located along with a form for beneficial use applications and an application for Department of Transportation inert waste beneficial use projects (<http://bit.ly/1alf5PA> Inert Waste Landfill Annual Report; Guideline 4, Guideline 4A; Beneficial Use Application; Department of Transportation Projects Inert Waste Beneficial Use Application). Reports compiling waste quantity data from these sources were not located. However, because it does not appear that annual reporting forms are tracking and because regulations do not dictate the tracking of either the origin or (if applicable) destination of CDD accepted at CDD management facilities, the highest CDD disposal data quality index score that the state could receive would be a 1. Because CDD disposal quantities are not readily available, the state's CDD disposal data category is currently 0.

CDD recycling information was also not available on the North Dakota Department of Health Waste Management website.

Resources

1. Solid Waste Management and Land Protection <http://1.usa.gov/1b7HzNj>
2. Chapter 33-20-05.1 Inert Waste Landfills <http://1.usa.gov/1d7R2DT>
3. Division of Waste Management <http://bit.ly/1jO5SP9>
4. North Dakota Century Code – Chapter 23-29. Solid Waste Management and Land Protection <http://www.legis.nd.gov/cencode/t23.html>

1.35 Ohio

Definition

Ohio Administrative Code (OAC) 3745-400-01 defines construction and demolition debris as:

those materials resulting from the alteration, construction, destruction, rehabilitation, or repair of any manmade physical structure, including, without limitation, houses, buildings, industrial or commercial facilities, or roadways. “Construction and demolition debris” does not include materials identified or listed as solid wastes, infectious wastes, or hazardous wastes pursuant to Chapter 3734. of the Revised Code and rules adopted under it; or materials from mining operation, nontoxic fly ash, spent nontoxic foundry sand, and slag, or reinforced or nonreinforced concrete, asphalt, building or paving brick or paving stone that is stored for a period of less than two years for recycling into a usable construction material.

For the purpose of this definition, “materials resulting from the alteration, construction, rehabilitation, or repair of any manmade physical structure,” are those structural and functional materials comprising the structure and surrounding site improvements, such as brick, concrete and other masonry materials, stone, glass, wall coverings, plaster, drywall, framing and finishing lumber, roofing materials, plumbing fixtures, heating equipment, electrical wiring and components containing no hazardous fluids or refrigerants, insulation, wall-to-wall carpeting, asphaltic substances, metals incidental to any of the above, and weathered railroad ties and utility poles.

“Materials resulting from the alteration, construction, rehabilitation, or repair” do not include materials whose removal has been required prior to demolition, and materials which are otherwise contained within or exist outside of the structure such as solid wastes, yard wastes, furniture, and appliances. Also excluded in all cases are liquids including containerized or bulk liquids, fuel tanks, drums and other closed or filled containers, tires, and batteries.”

Clean hard fill is defined as:

“construction and demolition debris which consists only of reinforced or nonreinforced concrete, asphalt concrete, brick, block, tile, and/or stone which can be reutilized as construction material. Brick in clean hard fill includes but is not limited to refractory brick and mortar. Clean hard fill does not include materials contaminated with hazardous wastes, solid wastes, or infectious wastes.”

No definition was found for land clearing debris.

Exemptions

According to OAC 3745-27-03(12), tree stumps disposed of in a licensed CDD disposal facility are exempted from Solid and Infectious Waste; Industrial Solid Waste Landfill; Residual Solid Waste Landfill; and Solid Waste, Industrial Waste Treatment, and CDD Facility Licenses OAC chapters.

OAC 3745-400-03 provides the following exclusions from CDD; and from Solid Waste, Industrial Waste Treatment, and CDD Facility Licenses OAC chapters:

1. Any construction site where construction debris and trees and brush removed in clearing the construction site are used as fill material on the site where the materials are generated or removed.
2. Any site where clean hard fill is used, either alone or in conjunction with clean soil, sand, gravel, or other clean aggregates, in legitimate fill operations.

Management Facilities

The following categories of solid waste management facilities may accept CDD or a specific component of CDD:

1. CDD landfills
2. MSWLFs
3. Incineration facility: CDD were not excluded within the rules but included on annual operating forms
4. Compost facilities

CDD Debris Disposal and Recycling Amounts

A single landfill annual operations report exists for municipal solid waste, industrial and residual landfill facilities to track the quantity and origin of CDD materials received, but based on a review of operational regulation for CDD landfills (OAC 3745-400-11), it does not appear that they are required to submit an annual operations report. CDD landfills are required to complete a CDD Facility Daily Log of Operations as required per OAC 3745-400-11(B), but there does not appear to be a regulated schedule for submitting the information requested in the daily logs (or a summary thereof) to Ohio EPA as is required for sanitary landfill facilities per OAC 3745-27-19(M)(2). An annual report form for solid waste transfer facilities exists which requests information concerning CDD origin, disposal destination, and recovered and disposal quantities.

<http://www.epa.ohio.gov/dmwm/Home/NonHWForms.aspx>

However, because it appears there is no Ohio EPA reporting requirement for tracking CDD disposed at CDD landfills, Ohio's CDD disposal data category is 0.

While there are reporting requirements for the amount of recyclables recovered/processed at solid waste transfer facilities, the annual operation report form does not specifically request CDD amounts, only total recyclables. Furthermore, diversion amounts were not found in periodic Ohio EPA solid waste management or material recovery facility recycling reports.

Resources

1. Ohio Materials and Waste Management Rules and Laws
<http://www.epa.ohio.gov/dmwm/dmwmnonhazrules.aspx>
2. Ohio Data, Reports and Studies – Facility Data Reports (Waste Disposal Data)
<http://epa.ohio.gov/dmwm/Home/SWMgmtPlanning2.aspx>

1.36 Oklahoma

Definition

Oklahoma Administrative Code (OAC) 252:515 defines construction/demolition waste to mean waste composed of the following:

asbestos-free waste from construction and/or demolition projects that may include such materials as metal, concrete, brick, asphalt, glass, roofing materials, limited amounts of packing materials, sheetrock, or lumber; wood waste that may include such materials as yard waste, lumber, wood chips, wood shavings, sawdust, plywood, tree limbs, or tree stumps; yard waste that may include such materials as grass clippings, tree limbs, tree stumps, shrubbery, flowers, or other vegetative matter resulting from land clearing or landscaping operations; or residential lead-based paint waste.

According to the above definition, land clearing debris is included in the definition of construction/demolition waste.

Exemptions

OAC 252:515-3-2 does not require the following CDD material facilities to have a permit:

1. Rock and dirt fills: that receive only uncontaminated rock, dirt, concrete, bricks or solidified asphalt
2. Yard waste composting facilities operated in accordance with a plan approved by DEQ

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD Landfills: only accepts CDD debris
2. MSW Landfills
3. Composting facilities: accept yard waste (yard waste includes vegetative matter from land clearing)
4. Roofing material recycling facility: accepts roofing material only

CDD Debris Disposal and Recycling Amounts

Two forms were found which must be completed by all solid waste disposal facilities – a monthly report form providing total disposal amounts and a quarterly return form providing information on total state fees collected as a result of total disposal amounts. These forms are required per OAC 252:515-19-33. <http://www.deq.state.ok.us/lpdnew/forms/indexswforms.html>

However, these forms (and applicable regulations) do not require reporting of CDD tonnages for disposal facilities – only total tonnages. Therefore, because CDD is not separately tracked at MSW landfills, the state's CDD disposal data category is currently 0. DEQ Annual reports were not found to contain landfill tonnage or CDD recycling information.

Resources

1. Oklahoma DEQ Rules and Regulations
<http://www.deq.state.ok.us/mainlinks/degrules.htm>
2. Oklahoma Statutes – Title 27A. Environment and Natural Resources
<http://www.oklegislature.gov/osstatuestitle.html>

3. Oklahoma DEQ Reports
<http://www.deq.state.ok.us/mainlinks/reports.htm>

1.37 Oregon

Definition

In the State of Oregon, as defined within Oregon Administrative Rules (OAR) 340-093-0030(26), construction and demolition waste

“means solid waste resulting from the construction, repair, or demolition of buildings, roads and other structures, and debris from the clearing of land, but does not include clean fill when separated from other construction and demolition wastes and used as fill materials or otherwise land disposed. Such waste typically consists of materials including concrete, bricks, bituminous concrete, asphalt paving, untreated or chemically treated wood, glass, masonry, roofing, siding, plaster; and soils, rock, stumps, boulders, brush and other similar material. This term does not include industrial solid waste and municipal solid waste generated in residential or commercial activities associated with construction and demolition activities.”

Land clearing debris components (soil, rock, stumps) are included in the CDD definition.

Exemptions

Clean fill as expressed above is excluded from the definition of construction and demolition. Clean fill as defined within 340-093-0030(18):

“means material consisting of soil, rock, concrete, brick, building block, tile or asphalt paving, which do not contain contaminants which could adversely impact the waters of the State or public health. This term does not include putrescible wastes, construction and demolition wastes and industrial solid wastes.”

Within 340-093-0080 inert wastes (if demonstrated to possess the characteristics of clean fill may be exempt from obtaining a solid waste permit). A disposal site used exclusively for the purpose of disposal of clean fill is exempted from requiring a permit as described in 340-093-0050(3)(C)

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. CDD landfills: receive only CDD waste (there are few CDD landfills in Oregon)
2. MSW landfills: most CDD goes into the MSW landfill
3. Incinerator: can accept solid waste, CDD falls under the definition of solid waste, CDD was not specifically prohibited

CDD Debris Disposal and Recycling Amounts

OAR 340-094-0040(13) and 340-095-0020(24)

(http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_094.html and http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_095.html) respectively list requirements for MSW and non-MSW landfills and prescribe that facilities must maintain records of daily load quantities, monthly and quarterly accumulations waste received, and that the Department of Environmental Quality can request this documentation at any time. As documented with the Oregon Material Recovery and Waste Generation Rates Reports (an annual report), disposal data collected for the report is gathered (<http://www.deq.state.or.us/lq/sw/recovery/materialrecovery.htm>) by the Department as part of assessing facility waste disposal fees. There is an annual reporting form for MSW facilities receiving less than 1,000 tons per year and a quarterly reporting form for MSW facilities receiving more than

1,000 tons per year to report the mass of waste the facility has received (volumetric quantities of waste are to be converted by using a conversion factor listed on the form which is 1.25 tons/yd³ for rubble, rock, asphalt, etc.). However, residential, commercial and CDD waste are reported together and therefore individual CDD quantities cannot be distinguished. Therefore, the state's CDD disposal data category is 0.

Private recyclers and recycling haulers must submit materials recovery forms to the Department annually (<http://www.deq.state.or.us/lq/sw/recovery/materialrecovery.htm>). The form for private recyclers does not break down the recycled materials so that recycled CDD quantities can be distinguished. The haulers form however does have a specific column dedicated to documenting the tons of CDD material collected (<http://www.deq.state.or.us/pubs/forms.htm#mrs>). The results from these forms are also incorporated into the annual state material recovery and generation rate report; however the report does not distinguish CDD quantities from other waste types.

Resources

1. Solid Waste General Provisions <http://bit.ly/1d7PdXB>
2. Oregon Administrative Rules <http://bit.ly/1njPUFX>
3. Solid Waste Reports and Guidance Documents <http://bit.ly/1fds2PM>
4. Material Recovery and Waste Generation Reporting Forms <http://bit.ly/1hN13uE>
5. DEQ Land Quality <http://1.usa.gov/LsTsHk>

1.38 Pennsylvania

Definition

The Commonwealth of Pennsylvania defines construction/demolition waste within Pennsylvania Code Article VIII, Chapter 271, Subchapter A, Sec. 271.1, as:

“solid waste resulting from the construction or demolition of buildings and other structures, including, but not limited to, wood, plaster, metals, asphaltic substances, bricks, block and unsegregated concrete. The term does not include the following if they are separate from other waste and are used as clean fill:

- (i) Uncontaminated soil, rock, stone, gravel, brick and block, concrete and used asphalt.
- (ii) Waste from land clearing, grubbing and excavation, including trees, brush, stumps and vegetative material.”

Clean fill is defined according to the following:

“Uncontaminated, nonwater-soluble, nondecomposable inert solid material used to level an area or bring the area to grade. The term does not include material placed into or on waters of this Commonwealth.”

Exemptions

Source-segregated debris (e.g., soil, concrete, used asphalt) and land clearing debris if used as clean fill are excluded from CDD definition.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. C/D Landfills
2. Resource Recovery Facility (includes processing/recycling and waste-to-energy facilities)
3. Municipal Waste Landfills
4. Municipal Waste Transfer Facilities

CDD Debris Disposal and Recycling Amounts

According to the Pennsylvania Code Article VIII – Municipal Waste, 273.312 Municipal Waste Landfills are required to quarterly report the type, quantity and origin of waste materials received. C/D landfills are only required to annually report the capacity used – there is no requirement to report the origin of waste received (277.312). Resource Recovery Facilities must submit a Host Municipality Benefit Fee Quarterly Report (283.263) which requires information on the tonnage of CDD handled by the facility – the origin and destination of CDD is not requested in the form (<http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-10678>). Transfer stations are not required to report the tonnages of materials handled (279.252). A waste conversion factor of 0.333 tons/cubic yard is provided for conversion from volume to weight-based estimates.

The Pennsylvania Department of Environmental Protection (DEP) provides in- and out-of-state CDD acceptance data for each Municipal Waste facility by facility or by county 2003-2012. The total CDD accepted at all the Municipal Landfills (currently 44 total sites - <http://www.portal.state.pa.us/portal/server.pt?open=514&objID=589660&mode=2>) is not provided – individual tonnages would have to be summed for each year. Tonnage data for C/D landfills (currently 4 sites) is not provided on DEP’s website. As CDD disposal tonnages for C/D Landfills are

not provided and CDD export information cannot be taken into account, the state's CDD disposal data category is 0.

CDD recycling data are available for 2006-2012 by county.

Resources

1. Pennsylvania Waste Management Statutes and Regulations
http://www.portal.state.pa.us/portal/server.pt/community/waste_management/14069/statutes_and_regulations/589774
2. Pennsylvania Code Article VIII – Municipal Waste
http://www.pacode.com/secure/data/025/articleIDVIII_toc.html
3. Pennsylvania Municipal Waste Report Forms
<http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-9023>
4. Pennsylvania Municipal Waste Disposal Info
<http://www.portal.state.pa.us/portal/server.pt?open=514&objID=589667&mode=2>
5. Recycling in Pennsylvania
<http://www.portal.state.pa.us/portal/server.pt?open=512&objID=14060&PageID=589559&mode=2>

1.39 Rhode Island

Definition

The Rhode Island Solid Waste Regulations #DEM OWM-SW04-01.3.00 defines CDD debris within the State of Rhode Island to mean

“non-hazardous solid waste resulting from the construction, remodeling, repair, and demolition of utilities and structures; and uncontaminated solid waste resulting from land clearing. Such waste includes, but is not limited to wood (including painted, treated and coated wood and wood products), land clearing debris, wall coverings, plaster, drywall, plumbing fixtures, non-asbestos insulation, roofing shingles and other roofing coverings, glass, plastics that are not sealed in a manner that conceals other wastes, empty buckets ten gallons or less in size and having no more than one inch of residue remaining on the bottom, electrical wiring and components containing no hazardous liquids, and pipe and metals that are incidental to any of the above. Solid waste that is not CDD debris (even if resulting from the construction, remodeling, repair, and demolition of utilities, structures, and roads and land clearing) includes, but is not limited to, asbestos waste, garbage, corrugated container board, electrical fixtures containing hazardous liquids such as fluorescent light ballasts or transformers, fluorescent lights, carpeting, furniture, appliances, tires, drums, containers greater than ten gallons in size, any containers having more than one inch of residue remaining on the bottom, and fuel tanks. Also excluded from the definition of CDD debris is solid waste resulting from any processing technique that renders individual waste components unrecognizable, such as pulverizing or shredding, at a facility that processes CDD debris.”

Exemptions

The state regulations exclude the following CDD debris from the definition of solid waste:

1. Used asphalt, concrete, or Portland cement concrete
2. Tree stumps

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. CDD Debris Processing Facility
2. Solid Waste Transfer Station
3. Solid Waste Landfill Unit – only two landfills currently operating in the state
4. Incinerator/Resource Recovery Facility

CDD Debris Disposal and Recycling Amounts

CDD debris that is disposed of in Rhode Island is placed in MSWLFs, otherwise the CDD debris is handled by CDD debris processing facilities, which are regulated by Solid Waste Regulation No. 7: Facilities that Process Construction and Demolition Debris (<http://1.usa.gov/1evHIL2>). Facilities that receive less than 50 tons per day of CDD debris are exempt from the requirement to obtain a solid waste management facility license; instead, they must go through a registration process and comply with all other applicable requirements and regulations. CDD Debris Processing Facilities are required to maintain records of amounts of CDD recycled and processed, though the frequency the State requests/requires filing this documentation and the method by which data are submitted is at present unclear (e.g., it appears that submittal may occur online). The state regulations do not appear to require facilities other than CDD Debris Processing Facilities to submit documentation of disposal or recycled amounts of CDD. Therefore, the state's CDD disposal data category is 0.

Resources

1. Solid Waste Regulations <http://1.usa.gov/1crqZMt>
2. Regulation No. 7 Facilities That Process Construction and Demolition Debris
<http://1.usa.gov/1evHIL2>
3. Regulation No. 2 Solid Waste Landfills <http://1.usa.gov/1aFKCS2>
4. Office of Waste Management Solid Waste webpage <http://1.usa.gov/L73xsC>
5. Department of Environmental Management Office of Waste Management
<http://1.usa.gov/1daxZZM>

1.40 South Carolina

Definition

As defined within the South Carolina Code of Laws Title 44, Chapter 96, Article 1, Section 44-96-40(6), construction and demolition debris means:

“discarded solid wastes resulting from construction, remodeling, repair and demolition of structures, road building, and land clearing. The wastes include, but are not limited to, bricks, concrete, and other masonry materials, soil, rock, lumber, road spoils, paving material, and tree and brush stumps, but does not include solid waste from agricultural or silvicultural operations.”

Exemptions

The only exemptions specifically included in the definition include those materials generated as a result of the agriculture and silviculture industries. It should be noted that land clearing debris is included in the definition. Although structural fill using CDD constituents such as hardened concrete, asphaltic concrete, brick is regulated by the state, structural fill activity in rights-of-way directly related to road construction under contract with the S.C. Department of Transportation is exempt from these regulations.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Class 1 Landfill – Land Clearing Debris
2. Class 2 Landfill – CDD debris landfill
3. Class 3 Landfill – MSW landfill
4. Structural fills – hardened concrete, clean hardened asphalt, bricks or masonry blocks, and land clearing debris
5. Solid Waste Processing Facility
6. Solid Waste Transfer Station
7. Solid Waste Incineration and Pyrolysis Facility

CDD Debris Disposal and Recycling Amounts

According to annual reporting forms, landfills are required to report CDD quantities and points of origin, while the other facilities (including wood chipping facilities, but excluding structural fills) are required to report the quantity, origin and destination (as applicable) of handled CDD. While the incineration form does not specifically require an input of CDD tonnages, it does have a blank where CDD components (if incinerated) could be listed (e.g., demolition wood chips). Reporting forms do not provide guidance on converting CDD quantities from volume to weight-based estimates. (<http://www.scdhec.gov/environment/lwm/html/solidwaste.htm#spreadsheets>)

Annual reports (available from 2008-2012) provide the total amount of state-generated CDD material disposed of at CDD landfills as well as the total amount of state-generated CDD material disposed of at MSW landfills (please see the data in the Fiscal Year 2011 report on pdf page 92). Also, while total exports of CDD are not provided in the report, total exports of solid waste are provided (see Fiscal Year 2011 report pdf page 85). Even if all waste exports were nothing but CDD, the state-generated CDD disposal would only be underestimated by less than 5%. The report does provide the number of structural fills and the amount deposited at these facilities. The state-approved structural fills are less than 1 acre in size and have a proposed life of less than 12 months. As the state requires

registration and specification of the maximum fill volume for these facilities, the state appears to have the data to estimate the amount of clean debris deposited at these facilities.

As the total CDD estimate based on the state tracked data appear to be within 5% of the actual (excluding the amount deposited in structural fill facilities) the state's CDD disposal data category is a 2.

The annual report provides the amount of CDD recycled annually. Although the recycling amount may include imported CDD, the methodology for the recycling amount estimation is based on an estimation of recycled amount per processing facility and, therefore, the inclusion of imported material would not impact the estimation.

Resources

1. Solid Waste Act and Solid Waste Management Rules
<http://www.scdhec.gov/environment/lwm/regs/R61-107-19.pdf>
<http://www.scstatehouse.gov/code/t44c096.php>
2. South Carolina Department of Health and Environmental Control – Solid Waste Management Annual Reports
http://www.scdhec.gov/environment/lwm/recycle/annual_report.htm#solidwastereport

1.41 South Dakota

Definition

In the State of South Dakota, Admin. R. S.D. 74:27:07:01(16) defines construction and demolition debris as

“waste building materials resulting from construction, remodeling, repair, and demolition operations on pavements, houses, commercial buildings, and other structures, excluding regulated asbestos-containing waste material or ash.”

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. CDD Debris Disposal Site
2. Restricted Use Site
3. Inert Waste Landfill
4. Solid Waste Incinerators
5. Type I Facility – MSW Landfill that receives more than 150,000 tons of solid waste each year
6. Type IIA Facility – MSW Landfill that receives between 25,000 tons and 150,000 tons of solid waste each year
7. Type IIB Facility – MSW Landfill that receives between 5,000 tons and 24,999 tons of solid waste each year
8. Type III Facility – MSW Landfill that receives between 500 tons and 4,999 tons of solid waste each year
9. Type IV Facility – MSW Landfill that receives less than 500 tons of solid waste each year

CDD Debris Disposal and Recycling Amounts

The state regulations do not appear to require facilities to report disposal and recycled amounts. Therefore, the state’s CDD disposal data category is 0.

Resources

1. Solid Waste Rules <http://1.usa.gov/1e54H4T>
2. Department of Natural Resources Solid Waste <http://1.usa.gov/1k2Tcux>

1.42 Tennessee

Definition

In the State of Tennessee, within Tenn. Comp. R. & Regs. 0400-11-01-.01, construction/demolition wastes

“means wastes, other than special wastes, resulting from construction, remodeling, repair and demolition of structures and from road building. Such wastes include but are not limited to bricks, concrete and other masonry materials, soil, rock and lumber, road spoils, rebar, paving material.”

Exemptions

The state regulations exclude the following CDD debris from requiring a solid waste permit <http://www.tn.gov/sos/rules/0400/0400-11/0400-11-01.20130318.pdf> (0400-11-01-.02):

1. Land clearing debris – as fill on the site of generation, less than one acre [(1)(b)3.(v)]
2. CDD waste – as fill on the site of generation, less than one acre [(1)(b)3.(vi)]
3. The use of solely natural rock, dirt, stumps, pavement, concrete and rebar, and/or brick rubble as fill material [(1)(b)3.(xiii)]
4. The processing of landscaping or land clearing wastes or unpainted, unstained, and untreated wood into mulch [(1)(b)3.(xix)]

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. Class I Disposal Facility – MSW sanitary landfill
2. Class II Disposal Facility – landfill receiving waste generated by one or more industrial or manufacturing plants
3. Class III Disposal Facility – landfill for the disposal of CDD waste, farming wastes, landscaping and land clearing wastes, and shredded automobile tires, and wastes of similar characteristics
4. Class IV Disposal Facility – landfill for the disposal of CDD waste, shredded automobile tires, and wastes of similar characteristics
5. Solid Waste Processing Facility – Class I wastes
6. Solid Waste Incinerator – Class I wastes

CDD Debris Disposal and Recycling Amounts

TCA 68-211-862 prescribes that Class I disposal facilities, solid waste processing facilities and solid waste incinerators are required to report the overall mass of waste received on a quarterly basis (<http://bit.ly/19ZC5ZM>). Since waste categories are not distinguished on this form, CDD material estimates cannot be made from the information provided on the form. Therefore, the state's CDD disposal data category is 0.

Resources

1. Solid Waste Processing and Disposal Rules <http://bit.ly/19ZALWw>
2. Division of Solid Waste Regulations <http://1.usa.gov/1dLDspK>
3. Quarterly Report for Landfills, Incinerators and Transfer Stations Form CN-1180 <http://bit.ly/19ZC5ZM>
4. Division of Solid Waste Management <http://1.usa.gov/1dayoeI>

1.43 Texas

Definition

The State of Texas defines construction or demolition waste within the Texas Administrative Code Title 30, Part 1, Chapter 330, Subchapter A, Rule §330.3(33) as:

“Waste resulting from construction or demolition projects; includes all materials that are directly or indirectly the by-products of construction work or that result from demolition of buildings and other structures, including, but not limited to, paper, cartons, gypsum board, wood, excelsior, rubber, and plastics.”

Although land clearing debris is not specifically included in the definition of CDD, some constituents of LCD are included in definitions of yard waste and brush (reproduced below) – land clearing debris could be considered an indirect by-product of construction work.

“Leaves, grass clippings, yard and garden debris, and brush, including clean woody vegetative material not greater than six inches in diameter, that results from landscaping maintenance and land-clearing operations. The term does not include stumps, roots, or shrubs with intact root balls.”

“Brush--Cuttings or trimmings from trees, shrubs, or lawns and similar materials.”

Exemptions

The state regulations exempt the following CDD constituent from state solid waste regulations under the definition for solid waste:

“Soil, dirt, rock, sand, and other natural or man-made inert solid materials used to fill land if the object of the fill is to make the land suitable for the construction of surface improvements”

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. Type I Landfill – standard MSW landfill
2. Type IV Landfill – accepts brush, CDD waste, and rubbish
3. Type V Facility – solid waste processing facilities including transfer and incineration facilities
4. Monofills

CDD Debris Disposal and Recycling Amounts

Forms for registered or permitted disposal and processing facilities both require information on the quantity and origin of CDD materials and yard waste or brush along with amounts diverted and disposed of. However, the processing form does not track the destination of waste quantities handled. On the landfill annual reporting form, a conversion factor of 0.2 tons/cubic yard is provided to convert uncompacted CDD quantities from a volumetric to weight-based amount. Although monofills are not required to report amount by the type of the waste accepted, these are allowed primarily to accept demolition waste; there was only one active monofill in the state in 2012. (http://www.tceq.texas.gov/permitting/waste_permits/waste_planning/wp_annual.html)

The Texas Commission on Environmental Quality (TCEQ) analyzes the data provided in these reports and publishes an annual summary report for the state (currently providing summaries from 2003-2012) based on these reports. According to the Municipal Solid Waste in Texas: A Year in Review report (for 2012 data, pdf page 17), Texas has no requirements for tracking the quantity of exported

solid waste. Considering that total solid waste imports represent less than 3% of all CDD disposed of in the state and that the mean demolition landfill tipping fee in Louisiana, New Mexico and Oklahoma is approximately 27%, 65% and 70%, respectively, of Texas's mean demolition landfill tipping fee (2012 information from the Waste Business Journal), it appears possible that a substantial fraction of Texas's CDD is being exported and managed out-of-state.

While all in-state landfills track and report the quantity and origin of CDD they accept for disposal, due to the unknown quantity of CDD leaving the state, the state's CDD disposal data category is a 1. Texas started providing quantities of diverted CDD in the summary reports starting in 2011.

Resources

1. Annual Summary of Municipal Solid Waste Management in Texas
http://www.tceq.texas.gov/permitting/waste_permits/waste_planning/wp_swasteplan.html
2. Texas Administrative Code, Title 30, Part 1, Chapter 330 – Municipal Solid Waste
[http://info.sos.state.tx.us/pls/pub/readtac\\$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=330](http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=330)

1.44 Utah

Definition

In the State of Utah, within Utah Administrative Code R315-301-2(17) construction/demolition waste means:

“solid waste from building materials, packaging, and rubble resulting from construction, remodeling, repair, abatement, rehabilitation, renovation, and demolition operations on pavements, houses, commercial buildings, and other structures, including waste from a conditionally exempt small quantity generator of hazardous waste, as defined by Section R315-2-5, that may be generated by these operations.

(a) Such waste may include:

- (i) concrete, bricks, and other masonry materials;*
- (ii) soil and rock;*
- (iii) waste asphalt;*
- (iv) rebar contained in concrete; and*
- (v) untreated wood, and tree stumps.*

(b) Construction/demolition waste does not include:

- (i) friable asbestos;*
- (ii) treated wood; or*
- (iii) contaminated soils or tanks resulting from remediation or clean-up at any release or spill.”*

According to the above definition, it appears that construction/demolition waste includes land clearing debris. However, land clearing debris is specifically included in the definition of yard waste as:

“vegetative matter resulting from landscaping, land maintenance, and land clearing operations including grass clippings, prunings, and other discarded material generated from yards, gardens, parks, and similar types of facilities. Yard waste does not include garbage, paper, plastic, processed wood, sludge, septage, or manure.”

Exemptions

R315-301-4(4) states the following, where R315-301 through 320 generally includes non-hazardous solid waste management regulations:

“When deposition or disposal of the following materials does not cause a hazard to human health or the environment or cause a public nuisance, the requirements of Rules R315-301 through 320 do not apply to:

- (a) inert waste used as fill material;*
- (c) the disposal of vegetative material generated as a result of land clearing”*

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Class I Facilities – MSW landfill also accepting waste from CESQG
2. Class II Facilities – MSW landfill also accepting waste from CESQG and less than 20 tons per day
3. Class IV Landfills – CDD waste, yard waste, inert waste, tires, dead animals, petroleum contaminated soils
4. Class V Facilities – commercial MSW landfill also accepting waste from CESQG

5. Class VI Facilities – commercial CDD waste (not containing PCBs), yard waste, inert waste, tires, dead animals, petroleum contaminated soils, and may be further limited by a permit
6. Solid Waste Transfer Stations
7. Solid Waste Incinerator
8. Compost Facility

CDD Debris Disposal and Recycling Amounts

According to R315-302-2(4), all landfills which can accept CDD and incinerators are required to provide an annual report detailing the total quantity of waste materials received. It is interesting to note that this regulation provides a volume to tonnage conversion factor for CDD as 0.5 tons/cubic yard. According to annual reporting forms, all landfill disposal facilities are required to report the quantity and origin of CDD disposed. Likewise, incineration facilities are required to report the origin and quantity of CDD used. However, transfer stations are only required to report the amount of CDD handled, and not its origin or destination – which means that it is likely not possible to quantify Utah CDD imports or exports. <http://1.usa.gov/1eedVdB>

While all disposal facilities which may accept CDD are required to report CDD tonnages and places of origin, it appears that transfer stations are not keeping track of the origin or destination of CDD materials. Therefore while landfills may be keeping track of the origin of wastes, it is not clear whether or not out-of-state waste received at a landfill by way of an in-state transfer station would count the waste as in-state or out-of-state. Therefore, Utah CDD disposal data could be given a maximum CDD disposal data category of 1. However, Utah only provides the previous year's CDD disposal data (<http://1.usa.gov/1x7x1KK>) – information on historic CDD disposal was not found and is not readily available. Therefore, the state's CDD disposal data category is currently 0.

Annual reporting forms for recycling facilities do not specifically request the amount of CDD recovered/diverted. Furthermore, no annual reports were available which provide CDD diversion information.

Resources

1. Utah Administrative Code
<http://1.usa.gov/1b1GKZj>
2. Disposal Facilities, Recyclers and Disposal Volumes
<http://1.usa.gov/1x7x1KK>
3. Solid Waste Program: Disposal Facilities, Recyclers and Disposal Volumes
http://www.hazardouswaste.utah.gov/Solid_Waste_Section/disposalfacilities.htm

1.45 Vermont

Definition

The State of Vermont, under Code Vt. R. 11P-03 §6-01, defines Construction and Demolition Waste as:

“For the purpose of these rules, waste derived from the construction or demolition of buildings, roadways or structures including but not limited to clean wood, treated or painted wood, plaster, sheetrock, roofing paper and shingles, insulation, glass, stone, soil, flooring materials, brick, masonry, mortar, incidental metal, furniture and mattresses. This waste does not include asbestos waste, regulated hazardous waste, hazardous waste generated by households, hazardous waste from conditionally exempt generators, or any material banned from landfill disposal under 10 V.S.A. §6621a.”

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations:

1. The disposal of trees, stumps, yard waste, and wood chips generated from these materials, when the origin and disposal of such waste occurs on property under the same ownership or control (§6-301(b)(1)).
2. Solid waste that has been treated or processed in a certified facility provided that the applicant demonstrates to the satisfaction of the Secretary that after treatment or processing the solid waste poses no threat to the environment, public health and safety and does not create a nuisance (§6-301(b)(5)).

It appears that both land clearing debris and structural fill are conditionally exempt from Vermont solid waste rules.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. CDD Waste Landfills – discrete disposal facilities
2. Categorical Disposal Facility – If the facility disposes of stumps, brush, untreated wood, bituminous concrete, non-recycled glass, concrete, masonry, mortar, porcelain, pottery, tile, clay pipe, and/or street sweepings
3. MSW landfill – discrete disposal facilities
4. Transfer Station
5. Recycling Facility

Clean wood will be banned from landfill disposal by July 1, 2016 as part of Vermont’s new solid waste law. Clean wood includes trees, untreated wood, and other natural wood debris such as tree stumps, brush and limbs, root mats and logs.

CDD Debris Disposal and Recycling Amounts

CDD Waste Landfills and MSW Landfills are required to report the amount of CDD received and disposed by the facility on a quarterly basis, as stated in §6-703 of Vermont Rule 11P-03. It is not clear whether Categorical Disposal Facilities are reporting the quantity and origin of materials received per §6-309(e)(4). Transfer stations and recycling facilities are required to report the amount and destination of CDD managed by the facility also on a quarterly basis, as stated in §6-1208(a) of Vermont Rule 11P-03. The quantity of CDD recycled for recycling facilities are also required to be reported as per §6-1207(c) and §6-1208(a).

Annual solid waste diversion and disposal reports were found for 2011 – 1999, which detail the amount of in- and out-of-state CDD/wood diverted and disposed. Waste management facility quarterly and annual reporting takes place through the Re-TRAC electronic reporting system.

(<http://www.anr.state.vt.us/dec/wastediv/solid/permit.htm>)

It should be noted that annual reports provide total tonnages of wood and CDD – regulatory definitions seem to suggest that “clean wood” and “untreated wood” – both would encompass land clearing debris materials. Therefore, it appears likely that the CDD/wood category includes both CDD and land clearing debris. State regulations appear to track the disposal of CDD at every facility that may accept CDD for disposal except for Categorical Disposal Facilities. Even though CDD imports and exports are tracked by the state, Vermont CDD disposal data is categorized as a 0 because it appears that not all CDD disposal facilities are tracking the quantities of CDD being deposited.

The only CDD diversion information available in annual reports appears to have been determined using the results of a waste composition study performed which estimated a CDD per capita estimation for Vermont citizens – state diversion tonnages were estimated by subtracting total state CDD disposal from the production of this per capita generation rate with the state’s population. Because this diversion data is not the result of periodically updated on-the-ground information, it was not considered for further analysis.

Resources

1. Solid Waste Management Rules
<http://bit.ly/1fk8iuD>
2. VT DEC Construction & Demolition website
<http://bit.ly/1mS1Hln>
3. Annual Solid Waste Diversion and Disposal Reports
<http://www.anr.state.vt.us/dec/wastediv/solid/DandD.htm>
4. Waste Management & Prevention Division
<http://bit.ly/1eiX6hx>

1.46 Virginia

Definition

The Commonwealth of Virginia separately defines construction waste and demolition waste within Administrative Code (VAC), 9VAC20-81-10 where:

"Construction waste" means solid waste that is produced or generated during construction, remodeling, or repair of pavements, houses, commercial buildings, and other structures. Construction wastes include, but are not limited to lumber, wire, sheetrock, broken brick, shingles, glass, pipes, concrete, paving materials, and metal and plastics if the metal or plastics are a part of the materials of construction or empty containers for such materials. Paints, coatings, solvents, asbestos, any liquid, compressed gases or semi-liquids and garbage are not construction wastes.

"Demolition waste" means that solid waste that is produced by the destruction of structures and their foundations and includes the same materials as construction wastes."

Although LCD is not specifically included in CDD definition, it is separately defined as "vegetative waste resulting from land-clearing activities" and included in definition of debris waste as follows:

"Debris waste" means wastes resulting from land-clearing operations. Debris wastes include, but are not limited to stumps, wood, brush, leaves, soil, and road spoils."

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations under the definition for solid waste (provided in 9VAC20-81-95):

1. Wood wastes burned for energy recovery.
2. Clean wood, wood chips, or bark from land clearing, logging operations, utility line clearing and maintenance operations and wood products manufacturing, when these materials are placed in commerce for service as mulch, landscaping, animal bedding, erosion control, habitat mitigation, wetlands restoration, or bulking agent at a compost facility.
3. Nonhazardous, contaminated soil that has been excavated as part of a construction project and that is used as backfill for the same excavation or excavations containing similar contaminants at the same site, at concentrations at the same level or higher.
4. Uncontaminated concrete and concrete products, asphalt pavement, brick, glass, soil, and rock placed in commerce for service as a substitute for conventional aggregate.
5. Clean, ground gypsum wallboard when used as a soil amendment or fertilizer, provided the conditions in 9VAC20-81-95 are met.

Management Facilities

The following categories of solid waste management facilities may accept CDD or a specific component of CDD:

1. Construction/Demolition/Debris (CDD) Landfills
2. Sanitary Landfills
3. Waste to Energy/Incineration Facilities
4. Solid Waste Transfer Stations
5. Materials Recovery Facilities

CDD Debris Disposal and Recycling Amounts

The owners or operators of all permitted solid waste management facilities that treat, store, or dispose of solid waste are required to report the amount of solid waste, by weight or volume, received and managed by the facility annually during the preceding calendar year (9VAC20-81-80); it appears that transfer stations would not be required to report the quantities to the state. The Virginia Department of Environmental Quality (DEQ) provides a form for all permitted solid waste management facilities to annually report the origin, (if applicable) amount managed off-site, quantity and management strategy for solid waste materials received at their facility. CDD is one of the included waste types for which each facility is asked to provide an accepted quantity. Tonnages for individual wastes must be categorized according to how they were managed (i.e., whether they were landfilled, recycled, composted, incinerated, mulched or other). An additional line in the form requests information regarding off-site management of materials including whether the materials were recycled or treated/stored/disposed (TSD). However, it should be noted that the form tracks the quantity of waste managed at an “off-site” location – this location may be outside of the state. DEQ allows the form filler to select whether quantities are being reported in cubic yards or tons – conversion factors for CDD or CDD materials are not provided on the form.

<http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/Forms.aspx> – See SWIA form DEQ 50-25 towards the bottom of the page)

DEQ provides annual reports summarizing state solid waste management (currently available for calendar year 1997-2012). Data provided in the reports is organized according to the reporting form categories. The report provide the total amount of CDD disposed of and diverted in the state (including imports). The total amount of imported CDD is provided though, and appears to comprise about 20% (for 2011) of the total CDD managed within the state (see 2011 report pdf page 15). However, the amount of imported CDD according to management strategy are not provided (e.g., imported CDD quantities are not separately listed for total disposal or recycled tonnages). Therefore, it is not possible to estimate the disposed of and recycled amounts of in-state CDD without making assumptions as to how it was managed. Also, Virginia does not provide information on CDD state exports – it is not possible to quantify the amount of state-generated CDD leaving the state. Furthermore, only the total amount of CDD managed (treated, disposed of, and stored) off-site is provided. Based on the information required on the reporting form, it appears that the state may have the imported CDD amounts by management strategy and amount exported.

LCD amounts are included in CDD tons in the annual reports. As clean debris filling operations are exempted from solid waste regulations, the CDD amount used in filling operation probably are not tracked and reported to the state.

Virginia appears to track the management of CDD at all state solid waste facilities, however, because of the following reasons the state’s CDD disposal data category is a 1:

1. Lack of disposal and diverted amounts of imported CDD, the state-generated CDD disposal amount may be overestimated (by approximately 35% based on the amounts reported for 2011), and
2. The contribution of CDD exports to the overall quantity of CDD disposed is unknown.

Although recycling amount may include imported CDD, the methodology for recycling amount estimation is based on estimation of recycled amount per processing facility and, therefore, the inclusion of imported amount does not impact the estimation.

Resources

1. VAC Agency 20 – Virginia Waste Management Board, Chapter 81 - Solid Waste Management Regulations
<http://1.usa.gov/MpJ5Ra>
2. Identification of Solid Waste
<http://lis.virginia.gov/cgi-bin/legp604.exe?000+reg+9VAC20-81-95>
3. Virginia DEQ Annual Solid Waste Reports
<http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/ReportsPublications/AnnualSolidWasteReports.aspx>

1.47 Washington

Definition

While construction or construction and demolition waste is not specifically defined in Washington Administrative Code (WAC), a definition for demolition waste is provided in WAC Title 173 Chapter 304 Section 100 as:

“solid waste, largely inert waste, resulting from the demolition or razing of buildings, roads and other man-made structures. Demolition waste consists of, but is not limited to, concrete, brick, bituminous concrete, wood and masonry, composition roofing and roofing paper, steel, and minor amounts of other metals like copper. Plaster (i.e., sheet rock or plaster board) or any other material, other than wood, that is likely to produce gases or a leachate during the decomposition process and asbestos wastes are not considered to be demolition waste for the purposes of this regulation.”

Although the regulations are silent on LCD, the annual reporting form for limited purpose landfill and MSW landfills list LCD.

Exemptions

173-350-200 WAC provides the ability for certain material management strategies to be exempt from requiring a permit for solid waste handling, though it does not provide examples of materials/management which may possibly meet this qualification. However, annual reporting forms request information from beneficial users including the quantity and type of material beneficially used, so it is likely that these number are reported in reported diversion tonnages.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Limited Purpose Landfills (e.g., wood waste, CDD landfills)
2. Inert Waste Landfill
3. MSW Landfill
4. Material Recovery Facility
5. Transfer Station

CDD Debris Disposal and Recycling Amounts

According to the Washington Department of Ecology (WDOE), each of these facilities is required to complete annual reporting forms including information on the type (specifically mentioning CDD and components of CDD), quantity (either tons or cubic yards), origin and (if applicable) destination of handled waste. For most forms, quantities can be submitted in either tons or cubic yards. Some conversion factors for specific components of CDD can be found appended to the recycling facility annual reporting form, since this is one of the few forms specifying that material quantities be reported in tons. (<http://www.ecy.wa.gov/programs/swfa/facilities/forms.html>)

WDOE-provided CDD material diversion and disposal information is provided in an Excel workbook which appears to be periodically updated (and which currently provides CDD disposal and diversion data from 1992-2011). While MSW landfills are currently required to specifically report tonnages of CDD accepted (this may not have been the case previously), the amount of CDD accepted at MSW landfills within the workbook was estimated as a percent of the total MSW received. This value was periodically updated using the results of 3 different waste characterization studies which took place in 1992, 2003 and 2009 (see footnote 2 in the workbook). Based on WDOE staff information, the listed tonnages are those exclusively originating from within the state.

It is interesting to note that tonnages of LCD diverted from disposal count towards the overall CDD diversion rate even though LCD is separately tracked from CDD on landfill annual report disposal tracking forms – which suggests that LCD is being included in the amount of CDD being disposed of in the state.

As the CDD disposal data includes amounts from all the facilities that may accept CDD and includes CDD in MSW loads, the CDD disposal data category is a 3.

CDD diversion information is provided in the same Excel workbook with the disposal information. The amounts of different CDD constituents recycled are also tracked.

Resources

1. Washington CDD Materials, Recycled, Diverted and Disposed (tons)
<http://www.ecy.wa.gov/beyondwaste/bwprogGBCandD.html> (click on the “Construction and Demolition Debris Data” link provided under one of the plots)
2. WAC 173-350 Solid Waste Handling Standards
<http://apps.leg.wa.gov/wac/default.aspx?cite=173-350&full=true#173-350-100>

1.48 West Virginia

Definition

The State of West Virginia defines Construction/Demolition Waste within W. Va. Code R. §33-1-2.38 as:

“waste building materials, packaging, and grubbing waste resulting from construction, remodeling, repair, and demolition operations on houses, commercial, and industrial buildings, including, but not limited to, wood, plaster, bricks, blocks and concrete, and other masonry materials, but does not include asbestos-containing materials, household furnishings, burnt debris, material containing lead-based paint, pressure-treated wood, contaminated solid waste, yard waste or waste tires, and other items listed in subdivision 5.4.a.”

§33-1-5.4a outlines the general requirements for the operation of Class D-1 and Class D (CDD) Solid Waste facilities as:

“Only the construction/demolition wastes approved in the facility permit must be accepted. Prohibited materials include, but are not limited to: putrescible wastes, household wastes, automobile shredder fluff, industrial wastes, sludge wastes, liquid paint, including lead-based paint or products coated with lead-based paint, lacquers, solvents, adhesives, cements, sealants, pesticides, aerosols, resin containers, brake fluid, lubricating oil and oil filters, any automotive fluids or fuels, railroad ties, pressure treated wood and engineered wood products, metal wastes (such as piping, wiring appliances, and “white goods”), electrical wastes (such as batteries, mercury-containing switches, ballasts, transformers and capacitors, fluorescent tubes, and computer equipment) carpet and other synthetic flooring material, or other items prohibited by the Class D General Permit Groundwater Protection Plan.”

Exemptions

The state regulations exclude the following CDD debris from requiring a solid waste permit:

1. The disposal of trees, stumps, woodchips, and yard waste generated from land clearing, when generation and disposal occur on the same property and the disposal area is less than one-half acre, is exempt from the permitting requirements (§3.16.e.2.A.).
2. The legitimate beneficial reuse of clean bituminous (asphaltic) concrete, Portland concrete, and other clean masonry substances for the purpose of fill, riprap, road surfacing or roadbase material is exempt from the permitting requirements (§3.16.e.2.D.).

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or a specific component of CDD debris:

1. Class A Facility – commercial MSW facility handling between 10,000-30,000 tons of solid waste per month
2. Class B Facility – commercial MSW facility handling a daily average of 100 daily tons, but does not exceed 10,000 tons per month, for population equal or greater than 40,000. Excludes CDD facilities
3. Class C Facility – commercial MSW facility handling a daily average of less than 100 daily tons, for population less than 40,000. Excludes CDD facilities
4. Class D Facility – facility for the disposal of only CDD waste, no greater than 2 acres in size
5. Class D-1 Facility – facility for the disposal of only CDD waste
6. Class E Solid Waste Recycling Facility
7. Municipal Solid Waste Landfill
8. Incinerator Facility

9. Recycling Facility
10. Transfer Station

CDD Debris Disposal and Recycling Amounts

Landfills and transfer stations are required to report the type, amount and source of solid waste disposed, by weight in tons, on a monthly basis as outlined in §33-1-4.12.b (as described for transfer stations in §33-1-5.2.k.11). However, it is not clear what types of waste are categorized in monthly tonnage reports. The West Virginia Department of Environmental Protection State of the Environment (Fourth Edition) report, while presenting total waste disposal tonnage, does not provide waste disposal type details. Therefore, while it is possible that CDD quantities and origin are being tracked for all disposal facilities, it does not appear that CDD (or other waste) exports are tracked – the highest CDD disposal data category that the state could receive is a 1. However, as CDD disposal data is not readily available, the state's CDD disposal data category is currently 0.

State CDD diversion data was not located.

Resources

1. Solid Waste Management Rules <http://bit.ly/1fgwZna>
2. Municipal Solid Waste Landfills <http://bit.ly/1fpHpFD>
3. WV Water and Waste Management Page <http://bit.ly/LdBrfl>
4. WV DEP Water and Waste <http://bit.ly/1nqthiX>

1.49 Wisconsin

Definition

As defined within Wisconsin Administrative Code (WAC) NR500.03(50), construction and demolition waste means:

“solid waste resulting from the construction, demolition or razing of buildings, roads and other structures. Note: Construction and demolition waste typically consists of concrete, bricks, bituminous concrete, wood, glass, masonry, roofing, siding and plaster, alone or in combinations. It does not include waste paints, solvents, sealers, adhesives or similar materials.”

While no separate definition for land clearing debris was found in WAC or Wisconsin Statutes, yard waste is defined in Wisconsin Statutes 287.01(17) as:

“leaves, grass clippings, yard and garden debris and brush, including clean woody vegetative material no greater than 6 inches in diameter. This term does not include stumps, roots or shrubs with intact root balls.”

Exemptions

The state regulations exempt the following CDD debris from WAC (NR 500.08(1)(b), (2)(a), (2)(e):

1. Riprapping projects using inert solid waste materials approved by the department, or in submerged shorelands in Lake Michigan, the title to which has been granted by the state to a municipality.
2. Facilities where only clean soil, brick, building stone, concrete or reinforced concrete not painted with lead-based paint, broken pavement, and wood not treated or painted with preservatives or lead-based paint are disposed.
3. Facilities where untreated, unpainted wood wastes including wood chips, bark, and sawdust are handled and stored properly and used for landscaping or trail surface course purposes in accordance with generally accepted practices.

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific components of CDD debris:

1. Small CDD Waste Landfills – smaller than 50,000 yd³
2. Intermediate CDD Waste Landfills – 50,000 yd³ to 250,000 yd³
3. Industrial Solid Waste Landfills – CDD landfills larger than 250,000 yd³
4. Municipal Solid Waste Landfills
5. Transfer Facilities
6. Processing Facilities
7. Incinerators

CDD Debris Disposal and Recycling Amounts

The Wisconsin Department of Natural Resources (DNR) require landfill operators to submit an annual report with the quantities, categories and origin of waste received at their facility (<http://dnr.wi.gov/topic/recycling/studies.html> – see near bottom of page).

CDD data (presented as material Category 25 in the table) is available for 2009-2012 and is reported annually for all permitted MSW and industrial landfills. Only 29 of these landfills are reported to

accept CDD. However, the tonnages from 15 small and 5 intermediate CDD landfill sites are not included in the annual disposal numbers. The quantity of exported CDD is not reported, though out-of-state waste is listed separately on the right side of the table. However, the total export of non-MSW waste (CDD and other industrial waste) in 2011 was less than 1%.

The data set is incomplete as CDD disposal information is only provided for industrial and MSW landfills and also because CDD export information is not available. Therefore, the state's CDD disposal data category is 0.

CDD diversion information was not found on Wisconsin DNR's website.

Resources

1. WAC NR 500 – General Solid Waste Management Requirements
http://docs.legis.wi.gov/code/admin_code/nr/500/500/02
2. Wisconsin Solid and Hazardous Waste Codes and Statutes
<http://dnr.wi.gov/topic/Waste/Laws.html>
3. Wisconsin Statutes Chapter 287 – Solid Waste Reduction, Recovery and Recycling
<http://docs.legis.wisconsin.gov/statutes/statutes/287>
4. Wisconsin DNR Landfill Tonnage Reports
<http://dnr.wi.gov/topic/Landfills/Fees.html>
5. Landfill listing
http://dnr.wi.gov/topic/Waste/documents/faclists/WisLic_SWLandfills.pdf
http://dnr.wi.gov/topic/Waste/documents/faclists/CDLandfillsIntermed_byFacName.pdf
http://dnr.wi.gov/topic/Waste/documents/faclists/CDLandfillsSmall_byFacName.pdf

1.50 Wyoming

Definition

The State of Wyoming (Solid Waste Rules and Regulations Chapter 1, Sect. 1(e)(i)) defines "construction/demolition waste" as:

"includes but is not limited to stone, wood, concrete, asphaltic concrete, cinder blocks, brick, plaster and metal."

Exemptions

The state regulations exclude the following CDD debris from state solid waste regulations § 1(I)(iii):

1. Clean fill: The disposal of clean fill consisting solely of uncontaminated natural soil and rock, hardened asphalt rubble, bricks, and concrete rubble in such a manner that does not create a health hazard, public or private nuisance or detriment to the environment

Management Facilities

The following categories of solid waste management facilities may accept CDD debris or specific component of CDD debris:

1. Construction/Demolition Landfill
2. Type I Solid Waste Landfill – MSW landfill
3. Type II Solid Waste Landfill – MSW landfill collection less than 20 tons daily, and no evidence of groundwater contamination
4. Solid Waste Transfer Station
5. Solid Waste Processing Facility

CDD Debris Disposal and Recycling Amounts

The state regulations do not appear to require facilities to report disposal and recycled amounts. Therefore, the state's CDD disposal data category is 0.

Resources

1. Solid and Hazardous Waste Division page
<http://deq.state.wy.us/shwd/>
2. Solid waste rules website
<http://bit.ly/L2fJuF>
3. Solid waste rules and regulations pdf
<http://bit.ly/1esjcKQ>
4. Chapter 4 Construction/Demolition Landfill Regulations
<http://bit.ly/1n76dpg>

Appendix B

Background on CDD Managed at Permitted and Registered Disposal Facilities

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2. Construction and Demolition Debris Managed at Permitted or Registered Disposal Facilities – Methodology Background

1.51 Overview

Several state environmental agencies (SEAs) collect and track the quantity of material managed at waste handling facilities in their state. Specific criteria were developed to identify those states that could be used to extrapolate data to other states where CDD management quantities are not tracked, routinely reported, or analyzed by the SEAs. The criteria were developed taking into account the following considerations:

- Does the state require facilities to track the quantity of waste materials handled at permitted or registered facilities, including CDD?
- Are CDD quantities tracked separately from other waste types?
- Are waste imports and exports tracked?
- Are waste quantity data routinely reported (e.g., annually)?
- Are waste management data readily available through the SEA website or does information on the SEA website suggest that waste management quantity data are available?
- At facilities that primarily handle wastes other than CDD, are material types tracked such that the quantity of CDD managed at those facilities can be assessed?

US EPA analyzed SEA websites and related information to examine the available data and compared the data to the above criteria.

1.52 Data Quality

CDD quantity data were identified, gathered, and organized for states where such information was readily available. The form of the available data varied; in many cases, quantity data were presented in an annual or biennial solid waste management report that covered state-related activities associated with waste handling, while in other cases waste handling data were available in spreadsheets or a simple data output format.

Based on the criteria stated in Section 1.1, US EPA developed a data classification system for states where data were available. A description of the data classification system is provided in Table B-1.

Ultimately, US EPA created four data classification categories based on the variability in the quantity and quality of data available from different states. For example, data classification of “3” represented the highest-quality data designating transparency in CDD managed at CDD facilities, CDD managed at other types of facilities (e.g., municipal solid waste landfills), and closely-tracked imports and exports of CDD materials for the state. Tracking imports and exports is critical so that the CDD management quantity at facilities in the state can be attributed to that state only.

Table B-2. Data Classification System Developed and Assigned to US States

Data Category	Brief Description	States
3	It appears that all CDD disposal data are tracked and available for every type of disposal facility that may accept CDD (not including LCD). CDD import and export data are also being tracked and are available.	Maine, Massachusetts, Washington, Florida
2	It appears that all CDD disposal data are tracked and available for every type of disposal facility that may accept CDD (not including LCD). CDD import and export data are also being tracked and are available. However, some portion of the CDD imports or exports may not be tracked/available (e.g., imported CDD disposal of at MSW landfills) but other data (e.g., total imports or exports of solid waste) suggest that the estimated amounts are within $\pm 15\%$ of the actual state-generated CDD disposal amount.	Kansas, Maryland, South Carolina
1	It appears that all CDD disposal data are tracked and are available for every type of disposal facility that may accept CDD (not including LCD). However, either some portion of CDD imports and exports may not be tracked/available (e.g., imported CDD disposal at MSW landfills) or other data (e.g., total imports or export of solid waste) suggest that the estimated amounts are outside of $\pm 15\%$ of the actual state-generated CDD amount.	Texas, Virginia, Nevada, Michigan
Data Not Available	CDD disposal data are not readily available, is not separately tracked from other waste types, or is not tracked at all.	The remaining 39 states

US EPA identified several routinely-tracked construction activity indicators for possible use in extrapolating the state CDD disposal amounts to a nationwide estimate. Table B-2 presents information on the data sets analyzed to identify a parameter that can be used as an indicator of state CDD disposal data. Of the 18 datasets listed, the following 7 (or individual statistics thereof) were excluded because their data are not tracked at the state level: New Residential Construction, Construction Spending, Survey of Residential Alteration and Repairs, Components of Inventory Change, American Housing Survey, USCB Economic Census – Nationwide Wrecking and Demolition Contractor Statistics, and the US EIA Commercial Buildings Energy Consumption Survey. Further, statistics from both Occupation Employment Statistics and the Quarterly Workforce Indicators were not further analyzed as Construction Wages and Salaries data appeared to be a surrogate for these statistics. Furthermore, a review of the Statistical Abstract of the United States suggests that most of statistics reported in the abstract were either not tracked at the state level or provided data already analyzed (e.g., building permits, construction wages and salaries) or provided data that did not appear to be related to construction activity (e.g., number of units by the number of bedrooms, homeownership) (USCB 2014).

Table B-3. Construction Activity Indicators Analyzed for Potential CDD Disposal Indicators

Title of Data Set	Description	Geography	Reporting Frequency
Total Wages and Salaries	Wages and salaries for all employees, as estimated by the Quarterly Census of Employment and Wages	US, states	Annual
Construction Wages and Salaries	Wages and salaries for employees of the construction industry, as estimated by the Quarterly Census of Employment and Wages	US, states	Annual
Population/Change in Population	Population estimates are performed using the most recent decennial census and updating using information based on births, deaths and migration	US, state, county, city, town, other sub-county	Annual
Total GDP	The market value of goods and services produced by labor and property for all industries - GDP is the sum of the compensation of employees; taxes on production and import; and gross operating surplus minus subsidies.	US, states	Annual
Construction GDP	The market value of goods and services produced by labor and property for the construction industry	US, states	Annual
Median Household Income	Median household income as determined by the Annual Social and Economic Supplement to the Current Population Survey	States	Annual
Number of Active Disposal/CDD Processing Facilities	Summary of the total number of active CDD disposal sites and CDD processing facilities for each state - data was compiled from state databases and data requests, direct contact of facilities provided on Construction and Materials Recycling Association's website, and on information from the Waste Business Journal (2012).	States	N/A
Building Permits	Housing units authorized by building permits for new residential construction	US, states, metro areas, counties, other permit-issuing places	Monthly
New Residential Construction	Starts and completions of new single- and multi-family housing units	US, 4 regions	Monthly
Construction Spending	Estimates of the total dollar value of construction work done in the US	US	Monthly

Title of Data Set	Description	Geography	Reporting Frequency
Quarterly Workforce Indicators	Employment, job creation, separations, turnover, average monthly earnings	States, metro areas, counties	Quarterly
Survey of Residential Alterations and Repairs	Residential Improvements and Repairs	US	Quarterly/ Annual (historic)
Occupational Employment Statistics	Provides detailed wage-related and employment statistics for numerous construction sub-industries	US, states (2012 only)	Annual
Components of Inventory Change (CINCH)	Changes in the characteristics of housing stock, including residential units demolished	US	Biennial (historic)
American Housing Survey (AHS)	Numerous housing statistics such as size and composition of housing, vacancies, fuel usage, physical condition, occupant characteristics, home improvements, residential units demolished	US, regions (limited)	Biennial
Statistical Abstract of the United States	Compilation of information from other surveys to provide annual statistics for the nation. Includes area of single-family home foundations, total value of residential construction put in place, information on major home improvements	US, regions, states	Annual
USCB Economic Census - Nationwide Wrecking and Demolition Contractor Statistics	Total annual payroll; number of establishments; number of paid employees; total value of sales, shipments, receipts, revenue or business done	US	Every 5 Years (historic)
US EIA Commercial Buildings Energy Consumption Survey	Provides information on commercial building floorspace	US	Every 4 Years (historic)

Data from the following remaining datasets was compiled and reviewed to identify their potential to serve as indicators of CDD disposal: Total Wages and Salaries, Construction Wages and Salaries, Population/Change in Population, Total GDP, Construction GDP, and Building Permits. Using 2000-2012 data for all states, correlation coefficients were estimated between several of these statistics which were believed to be representative of very similar/nearly identical data. As Figure B-1 shows, the data provided by Construction Wages and Salaries correlate well against Construction GDP. Similarly, Figure B-2 reveals that Construction GDP is well correlated with Total Industry GDP, and Figure B-3 shows that Total Wages and Salaries are very well correlated with Total Industry GDP. Finally, Figure B-4 strongly suggests that total state population is very well related to Construction GDP – 2005 and 2009 data (representative of economic conditions just before and following the housing market recession). Therefore, for the purpose of identifying a unique representative indicator of CDD disposal, Total Wages and Salaries, Construction Wages and Salaries, Total Industry GDP, Construction Industry GDP and State Population were all considered to provide very similar or nearly identical data trends.

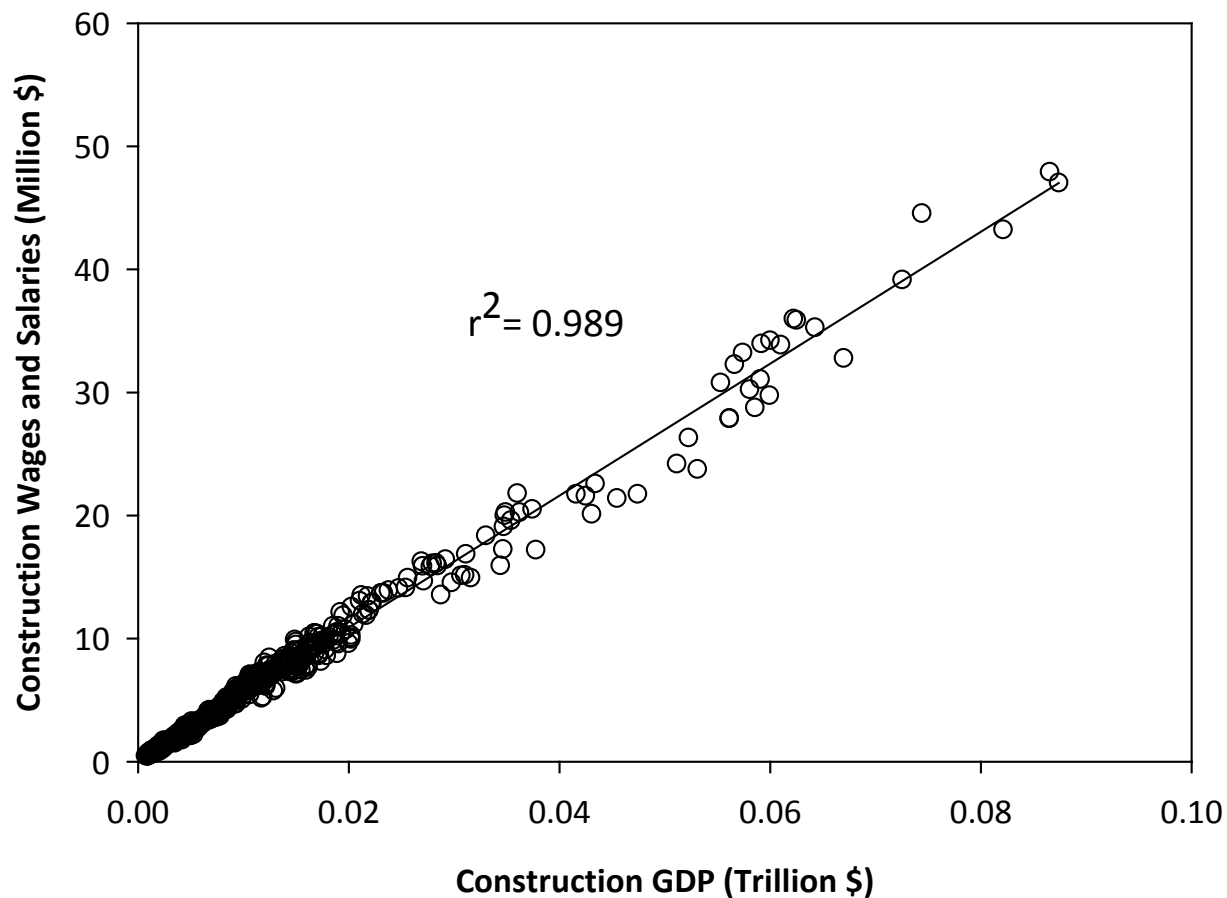


Figure B-2. Correlation of Construction Wages and Salaries Versus Construction GDP in the US, Years 2000 - 2012 Data for All States

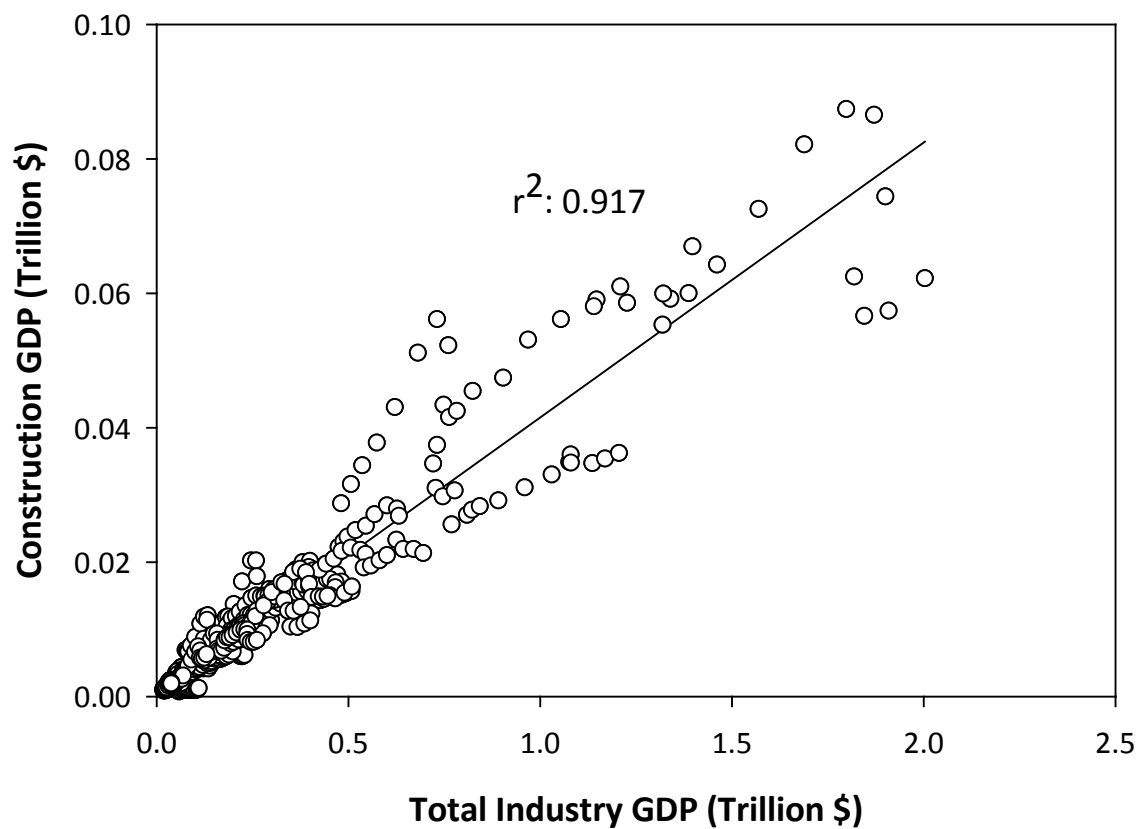


Figure B-3. Correlation of Construction GDP and Total Industry GDP, Years 2000 - 2012 Data for All States

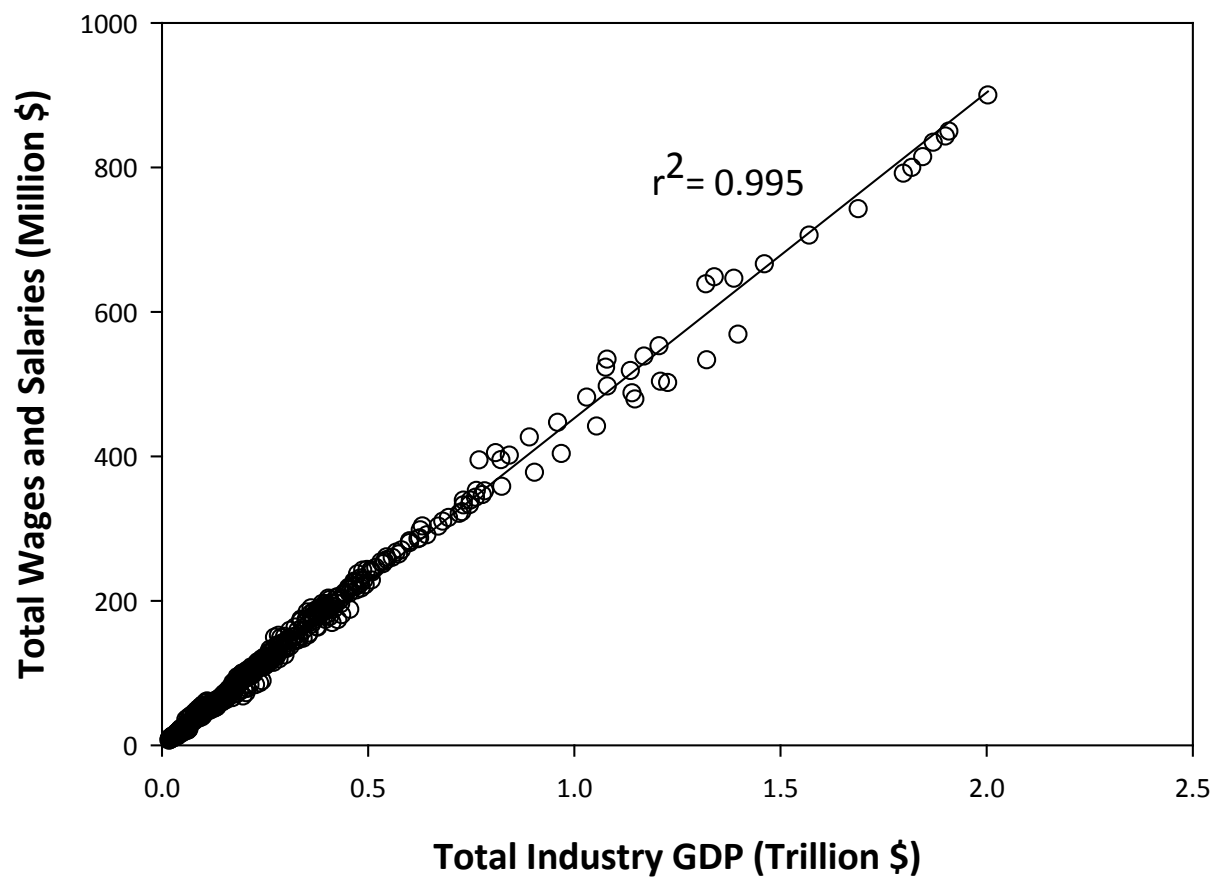


Figure B-4. Correlation Between Total Wages and Salaries and Total Industry GDP, Years 2000 – 2012 Data for All States

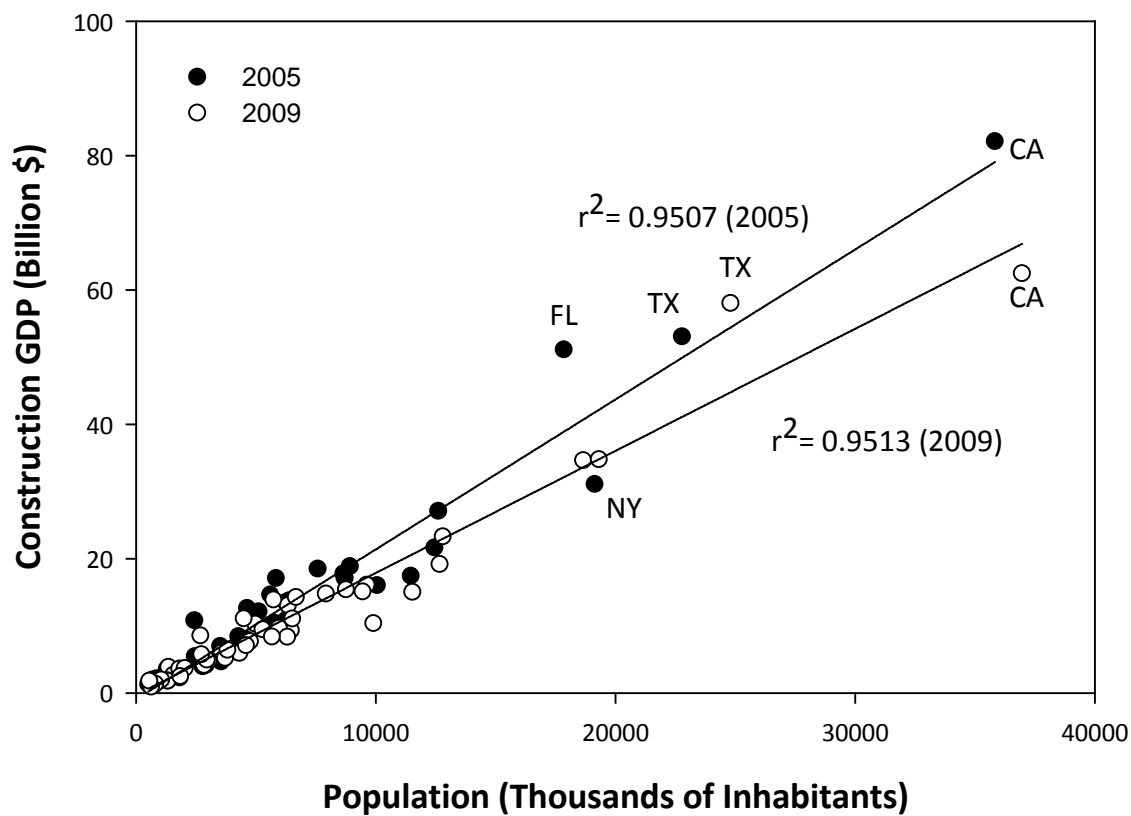


Figure B-5. Correlation Between Construction GDP and State Population, Years 2005 – 2009 Data for All States

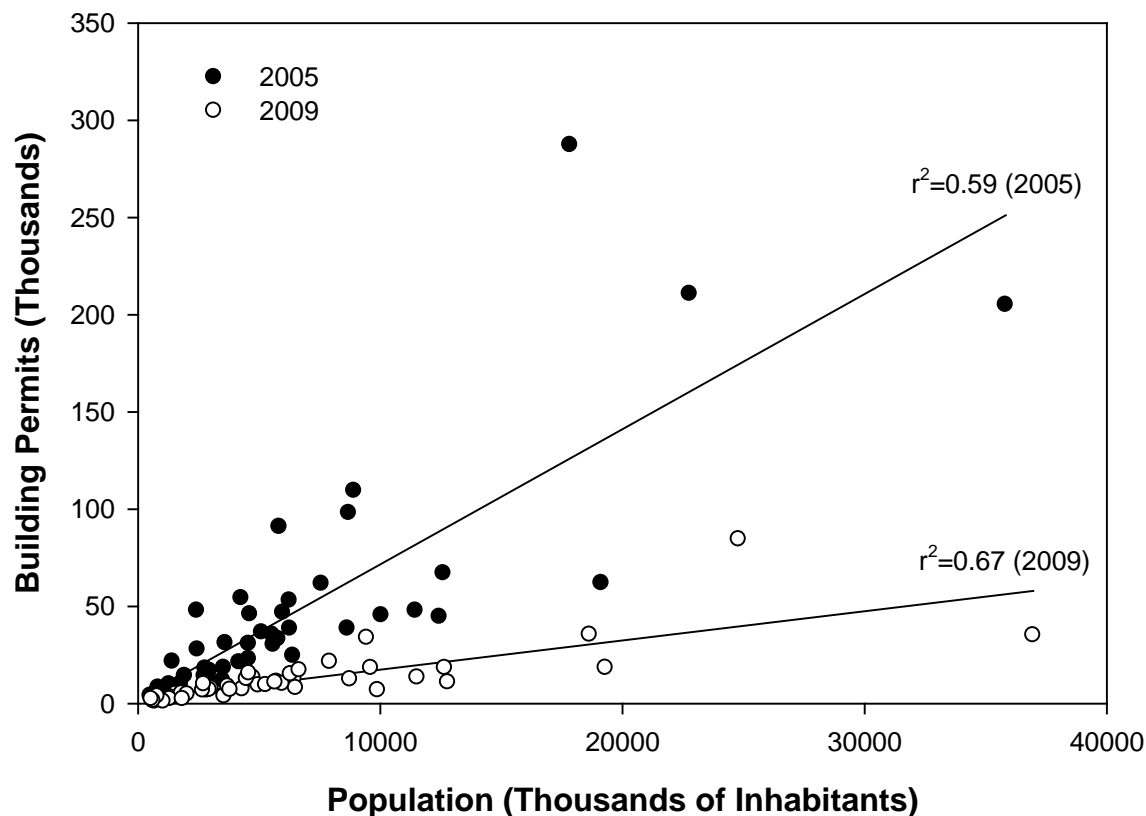


Figure B-6. Correlation Between Building Permits and State Population, Years 2005 – 2009 Data for All States

A relatively poor correlation was found between building permits and population data, as presented in Figure B-5. Therefore, building permits and state population seemed to distinctly capture aspects of construction activity and were separately analyzed to identify the parameter that correlate better with CDD disposal rates. Further analysis of the CDD disposal and population trend for Florida for 2003-2009 showed that the CDD disposal varied independently of the population. As shown in Figure B-6; CDD disposal increased from 2003 through 2005 and thereafter declined even though the population consistently increased throughout this period. Building permit data on the other hand mimicked the CDD disposal trend, as shown in Figure B-7. The number of building permits issued by a state is directly related to construction activity (i.e., more building permits will necessarily mean more construction and as a result more CDD generation and disposal) while state population or population change is not a direct indicator of the construction activity (e.g., there may be existing housing capacity for population growth). Building permits were, therefore, selected for this nationwide CDD disposal estimation methodology. Although building permit numbers do not include renovation and demolition activities, it is the only construction activity indicator, apart from Construction GDP and Construction industry wages and salary data, that is routinely tracked for each state in the US.

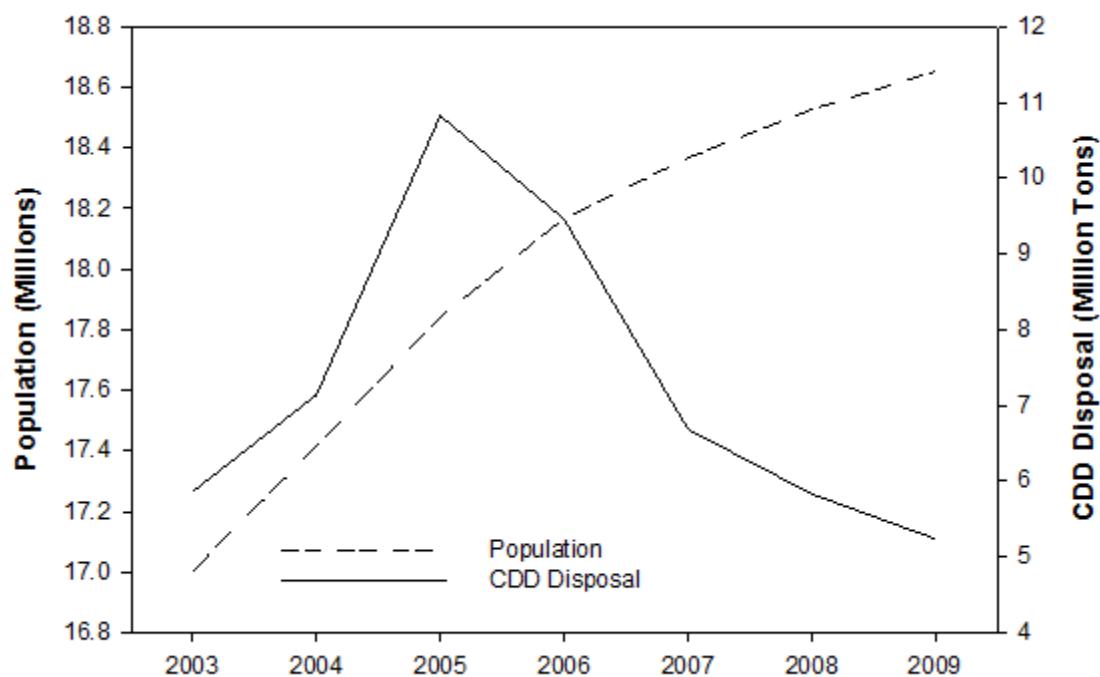


Figure B-7. Comparison Between State Population and CDD Disposed Reported by Florida, Years 2003 through 2009

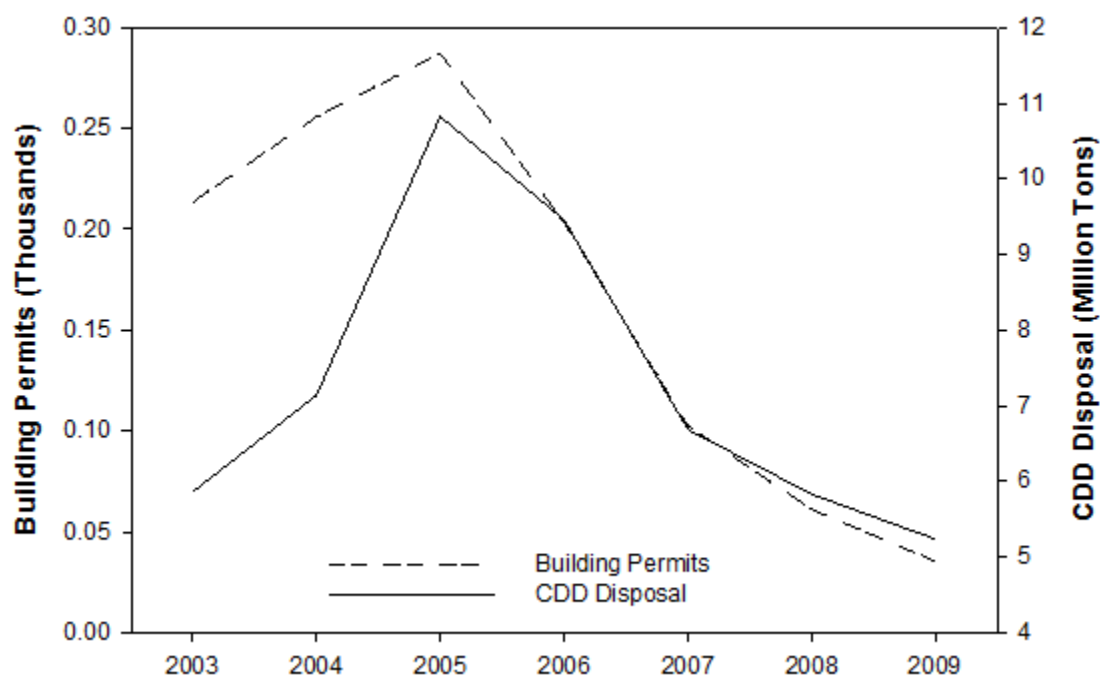


Figure B-8. Comparison of Number of Building Permits Issued and the Quantity of CDD Disposed in Florida, Years 2003 through 2009

State CDD disposal quantities from 2008 – 2011 were plotted against the total number of building permits issued by each respective state. While historical CDD disposal data were found and analyzed back to 2003, the limited number of disposal quantity data points prior to 2008 impaired the ability to observe data trends. Figures B-8 through B-11 show that the correlation coefficient of building permits versus CDD disposal quantity for each year's trend line ranges from 0.82 – 0.93. (The states used in the correlations shown in Figures B-8 through B-11 differ because data from the same states were not available every year). Strong correlations of annual CDD disposal data with building permit numbers for 2008, 2009, 2010, and 2011 show that building permits are an effective surrogate parameter to extrapolate the CDD disposal data of high quality to those states that currently do not track CDD disposal data or do not track CDD disposal from all facilities.

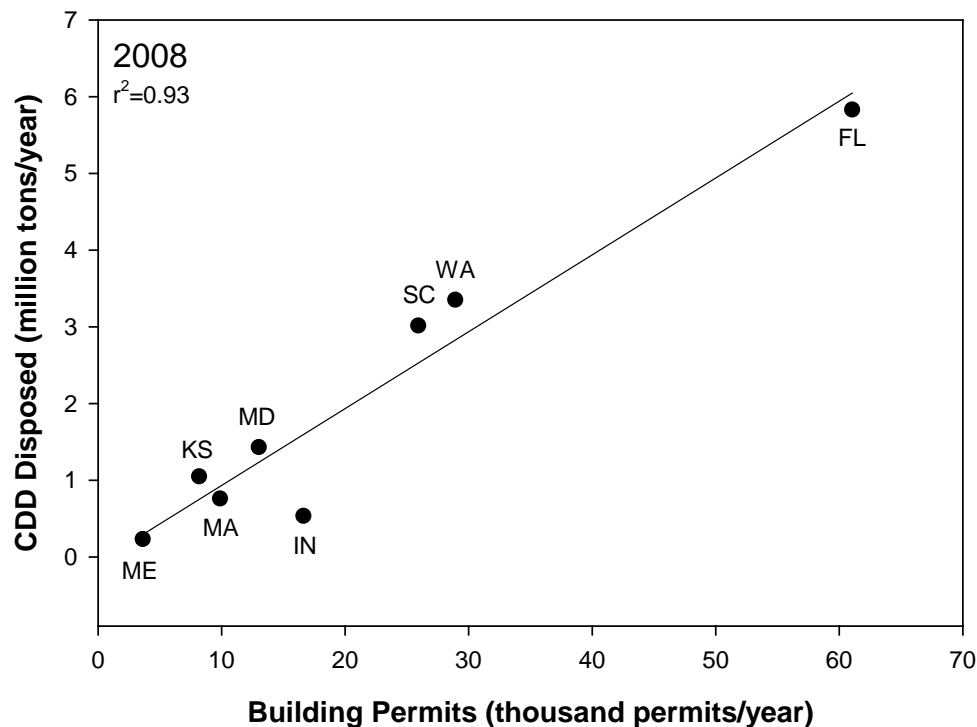


Figure B-9. Correlation of Building Permits and CDD Disposal Quantity for Eight States for the Year 2008

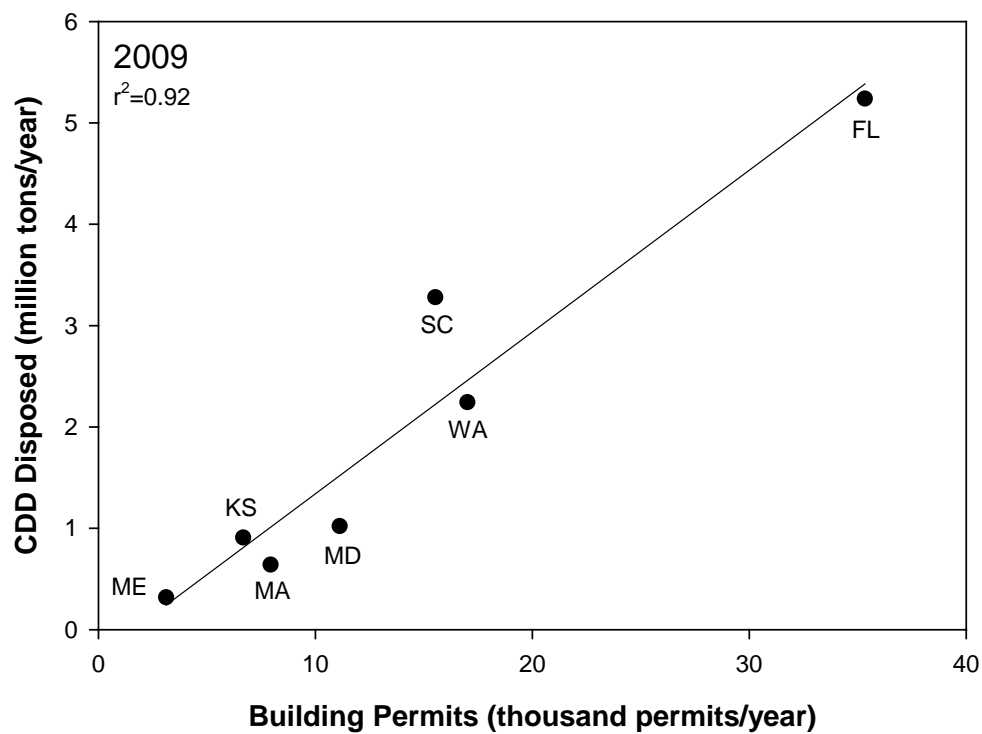


Figure B-10. Correlation of Building Permits and CDD Disposal Quantity for Seven States for the Year 2009

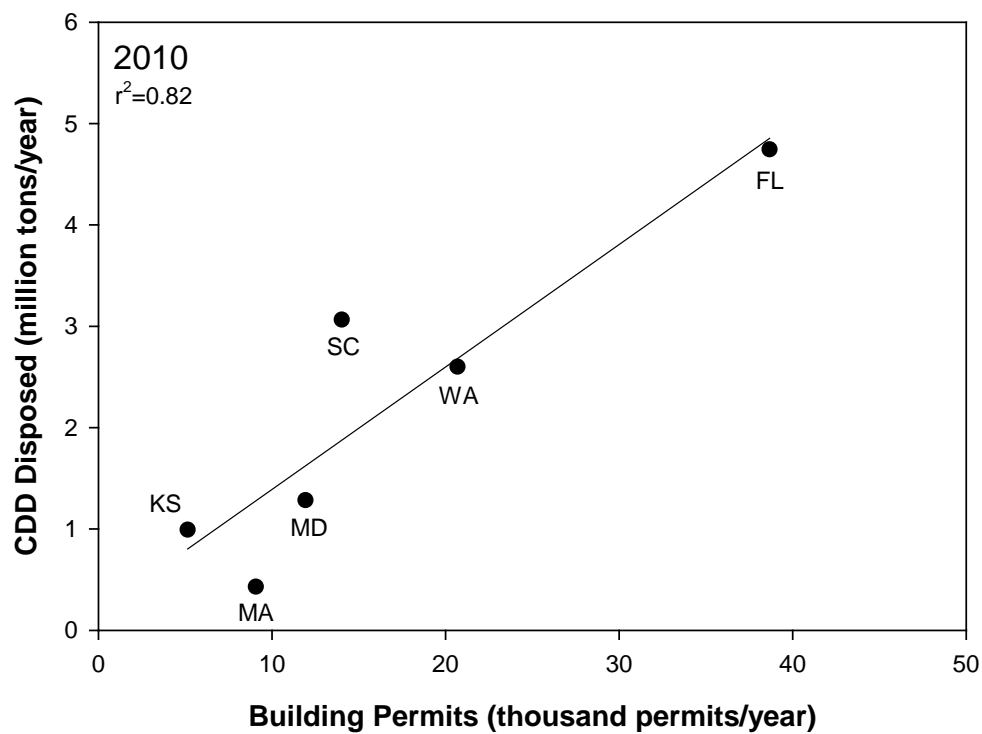
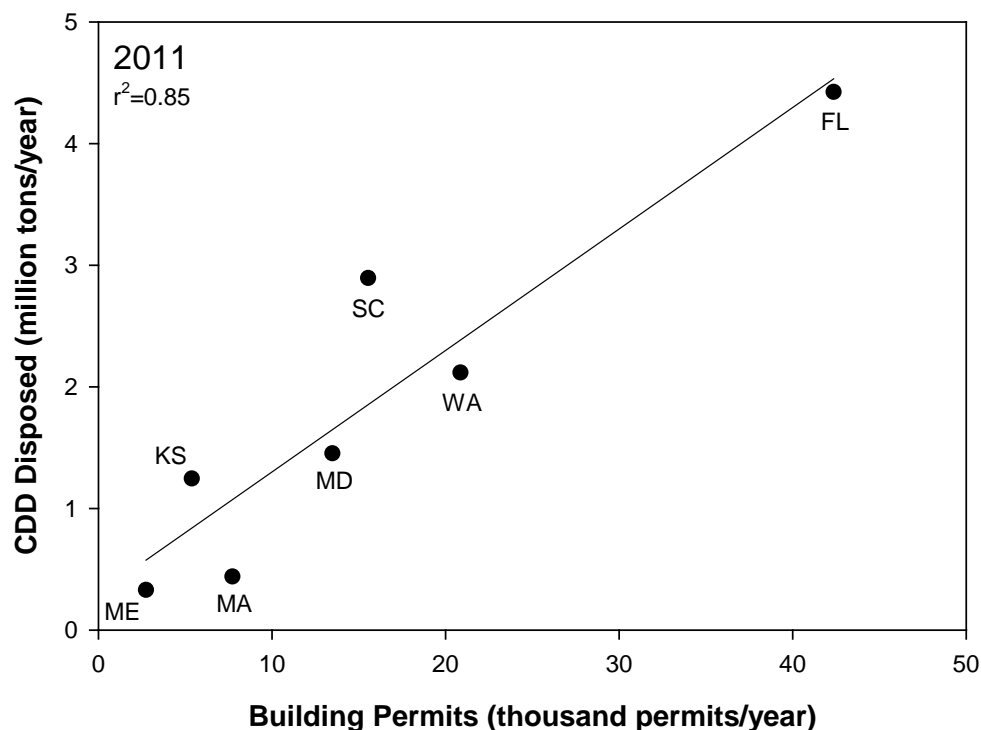


Figure B-11. Correlation of Building Permits and CDD Disposal Quantity for Six States for the Year 2010**Figure B-12. Correlation of Building Permits and CDD Disposal Quantity for Seven States for the Year 2011**

Based on this analysis, the methodology to estimate CDD disposal will consist of two elements:

1. Amounts disposed at CDD disposal facilities as tracked and reported by states.
2. A calculated CDD disposal quantity for states that do not track CDD disposal amounts. At the time of this writing, there are 39 states that do not track CDD disposal on a routine basis.

US EPA notes that extrapolating CDD quantities in states that do not routinely collect or report CDD disposal data should not be equated with the idea that the issuance of a new building permit results in some fixed quantity of CDD that is disposed. Rather, based on an examination of multiple (18) routinely-published data sets, the building permits figure correlated the best with the known, high-quality CDD disposal data over 4 years. As described in the report, when calculating the total CDD materials disposal quantity for the year 2011, the percentage of the estimate consisting of data tracked and reported by states represents 35 percent of the total disposal estimate. Thus, the application of this methodology can eliminate the potentially large range or potential error associated with top-down approaches such as MFA.

It should be noted that the CDD disposal data tracked does not include CDD arriving at MSW landfills in commingled loads. Commingled CDD-MSW loads that arrive at MSW landfills are tagged as MSW loads, and the CDD portion is probably not tracked and reported to the states. There are states that calculate this portion. For example, the state of Washington uses the MSW disposal amount along

with the statewide MSW characterization data to estimate CDD disposal amounts at MSW landfills. The CDD data presented in annual reports for Florida are based on annual reports submitted by all of Florida's individual counties. The counties not only add the county-originated CDD amounts disposed of at CDD landfills (compiled and provided to the Counties by Florida Department of Environmental Protection) but also add the fraction of CDD disposed of at MSW landfills using either site-specific or default MSW composition data (provided by FDEP) and MSW disposal data. This may be the case with other states with a data quality ranking of 2 and 3. Additional information was not available in the state reports to confirm this.

1.53 About Building Permits

Since building permits were selected for this nation-wide CDD disposal estimate, a description of these statistics is presented in greater detail. Although building permit numbers do not include renovation and demolition activities, it is the only construction activity indicator, apart from Construction GDP and Construction industry wages and salary data, that is routinely tracked for each state in the US. According to the US Census Bureau (USCB), a building (or zoning) permit is the "approval given by a local jurisdiction to proceed on a construction project". Specifically, tracked permits are for new privately-owned housing units and data is obtained by a voluntary mail survey on both an annual and monthly basis (where about half of permit issuers are surveyed monthly and the other half annually). Most respondents are individual permit offices, but also included are counties and townships (to a lesser extent).

For monthly estimates since 2005, a total of 9,000 permit issuers were selected from a universe of 20,000 places. This number includes all issuers in the 75 metropolitan areas with the greatest number of (year) 2002-authorized housing units, all issuers in states with less than 50 issuers, and all issuers with "special" (details not provided) reporting arrangements. Remaining issuers were stratified by state and ordered within each state by the weighted average of housing units authorized in (years) 2000, 2001 and 2002. Issuers with a "large" (details not provided) weighted average were selected for monthly surveys, where the remaining issuers were selected at a rate of 1 in 10.

If a report is not received from a selected issuer, data from the Survey of Construction is used to complete the missing data (which is used to collect information on housing starts, sales and completions). If the Survey of Construction does not have the necessary information, the statistic is imputed based on the assumption that the ratio of the current number of building permits issued for that jurisdiction to the total number of permits issued for that census region is the same for the current year as it was for the previous year.

USCB states overall that the data is fairly reliable with the following notes:

- Some new residential construction work (likely very small) in building permit jurisdictions is not recorded.
- Some locality boundary lines are redefined over time, so some data will not be completely comparable from a geographic standpoint.

It is noted that "not all areas of the country require a permit for construction", but the USCB estimates that less than 2% of all US privately-owned housing units falls into this category. These areas are excluded from the survey.

3. References

United States Census Bureau, USCB (2014). Statistical Abstracts of the United States for 2011-2012. Section 20: Construction and Housing.
<http://www.census.gov/prod/2011pubs/12statab/construct.pdf>. Accessed on 10 January 2014.

Appendix C

Background on CDD Managed at Permitted or Registered Processing Facilities

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4. Construction and Demolition Debris Managed at Permitted or Registered Processing Facilities – Project Background

The number of active CDD processing facilities as of the year 2012 was used to facilitate the development of the CDD diversion quantity estimate. The active CDD processing facilities database was developed using the following sources (noting that the majority of the data came from state-reported facility inventories): state-reported facility inventories, a trade organization database (WBJ 2012), and companies that are members of the Construction Materials Recycling Association (now the Construction and Demolition Recycling Association). A total of 512 active CDD processing facilities were identified.

Table C-1 presents a summary of CDD processing facilities in the US – note that the data represent facilities that nearly exclusively process CDD debris, which was determined by obtaining lists of CDD-only processing facilities from the states or by filtering data in the WBJ (2012) database to include only those facilities that listed CDD as the only materials processed. In general, there appear to be a greater number of facilities in the states located on the east and west coasts of the US. The count of facilities presented in Table C-1 contains some gaps and thus likely underestimates the total number of CDD processing facilities in the US. Several states exempt certain recycling activities from regulation under solid waste rules, and as a result, these activities may not be documented at the state level.

Table C-4. Number of CDD Processing Facilities in Each State (USEPA 2013)

State	Processing Facilities - 2012
Alabama	1
Alaska	1
Arizona	1
Arkansas	0
California	55
Colorado	10
Connecticut	32
Delaware	2
Florida	23
Georgia	7
Hawaii	0
Idaho	1
Illinois	1
Indiana	4
Iowa	1
Kansas	2
Kentucky	2
Louisiana	3
Maine	2
Maryland	4
Massachusetts	16
Michigan	7
Minnesota	17
Mississippi	2
Missouri	3
Montana	0
Nebraska	0
Nevada	0
New Hampshire	2

State	Processing Facilities - 2012
New Jersey	58
New Mexico	1
New York	81
North Carolina	17
North Dakota	15
Ohio	41
Oklahoma	1
Oregon	13
Pennsylvania	3
Rhode Island	3
South Carolina	13
South Dakota	11
Tennessee	7
Texas	11
Utah	0
Vermont	0
Virginia	23
Washington	10
West Virginia	0
Wisconsin	3
Wyoming	2

Historically, CDD diversion quantities have been reported annually for 12 states, as presented in Table C-2. However, it should be noted that only 10 states provided diversion information used in the 2011 CDD diversion estimate (i.e., Georgia and Nevada do not provide CDD diversion data for 2011). This table also includes information on the name of the CDD diversion quantity reporting agency, hyperlinks to access the information, and notes on where diversion information is located and how quantities were determined. For the purpose of this report, diversion represents all the other CDD management approaches apart from landfill disposal (e.g., reuse, recycling, compositing, combustion with and without energy recovery). CDD diversion information included essentially no details on CDD import/exports – it is possible that significant quantities of CDD diversion amounts were accepted from out-of-state sources. However, it was assumed that the total diversion quantities reported by each state were representative of in-state generated material.

Table C-5. Location of CDD Diversion Data for Reporting States

State	Reporting Agency	Hyperlink	Notes
MA	Department of Environmental Protection	http://www.mass.gov/eea/agencies/massdep/recycle/reduce/managing-construction-demolition-wastes.html#4	Diversion taken as the sum of CDD Recycling and Other CDD Diversion
FL	Department of Environmental Protection	http://www.dep.state.fl.us/waste/quick_topics/publications/default.htm	See additional information included in Appendix A for additional details on diversion in this state.
ME	Department of Environmental Protection	http://www.maine.gov/dep/sustainability/publications/	Information in report
WA	Department of Ecology	http://www.ecy.wa.gov/beyondwaste/bwprogGBCanD.html	Information in spreadsheet accessible through hyperlink under one of the plots on the webpage
MD	Department of the Environment	http://www.mde.state.md.us/programs/Land/RecyclingandOperationsprogram/Publications/Pages/Programs/LandPrograms/Recycling/publications/index.aspx#recycling	Information in report
TX	Commission of Environmental Quality	http://www.tceq.texas.gov/permitting/waste_permits/waste_planning/wp_swasteplan.html	Information in report
VA	Department of Environmental Quality	http://www.deq.virginia.gov/Programs/LandProtectionRevitalization/ReportsPublications/AnnualSolidWasteReports.aspx	Diversion taken as the sum of Recycled, Composted, Incinerated and Other
NV	Division of Environmental Protection	http://nevadarecycles.nv.gov/Resources/Data/	
PA	Department of Environmental Protection	http://www.portal.state.pa.us/portal/server.pt?open=512&objID=14060&PageID=589559&mode=2	
GA	Environmental Protection Division	http://www.gaepd.org/Documents/lpb_solidwaste.html#swforms	Information included in spreadsheet with annually reported solid waste tonnages
NJ	Department of Environmental Protection	http://www.nj.gov/dep/dshw/recycling/stats.htm	Diversion taken as the sum of Brush/Tree Parts, Stumps, Concrete/Asphalt/Brick/Block and Wood Scraps
CO	Department of Public Health and Environment	http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251616361671	

US EPA had previously analyzed surrogate parameters which could allow an estimate of CDD diversion similar to the CDD disposal estimate methodology including median household income and the ratio of CDD processing facilities to total CDD management facilities (i.e. processing and disposal facilities). However, when plotted against state-reported diversion data, neither of these parameters showed a discernable correlation.

5. References

USEPA (2013). Data Gap Analysis and Damage Case Studies: Risk Analyses from Construction and Demolition Debris Landfills and Recycling Facilities. Draft report, October 23, 2013

WBJ (2012). Directory of Waste Processing and Disposal Sites 2012.

Appendix D

Alternative RAP Estimate Methodology

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6. Alternative RAP Recycled Estimate Methodology

In the event that the National Asphalt Pavement Association (NAPA) survey is discontinued in the future, the US EPA developed a simple RAP recycling estimate methodology. The US EPA identified a routinely-tracked indicator, capital outlay, published by the Federal Highway Administration (FHWA) as a factor that would be expected to mirror RAP usage. Certainly, several factors could cause the amount of RAP to increase or decrease (e.g., modification of state specifications that allow a greater fraction of RAP to be used in a mix design). To assess the robustness of this approach, the US EPA calculated a factor relating capital outlay to the quantity of RAP recycled as reported by NAPA for the years 2009, 2010, and 2011.

A link to the FHWA data source is provided in the references (FHWA 2014). The capital outlay factor was calculated by dividing the total capital outlay by the reported RAP recycling quantities for the aforementioned years. The results showed that the amount of RAP recycled per \$1,000 of capital outlay for years 2009, 2010, and 2011 was 0.90, 0.83, and 0.90.

Although the number of data points is limited, this approach shows that the calculated factors above show reasonably good agreement. If the NAPA survey is continued for another few years, additional capital outlay factors can be calculated to further support (or refute) this approach and a new alternative approach could be proposed at that time, again depending on whether or not NAPA continues its survey.

7. References

FHWA (2014). Funding for Highways and Disposition of Highway-User Revenues, All Units of Government. <http://www.fhwa.dot.gov/policyinformation/statistics/2011/hf10.cfm>. Accessed 20 February 2014.

Appendix F

Checklist for Data Collection for Future CDD Generation and Management Estimates

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1. Checklist for Data Collection for Routine CDD Estimate Using the IWCS Methodology

Table F-1 presents a checklist of data needs for the CDD estimate. As appropriate, notes are provided to guide decision-making in future years.

Table F-6. Checklist of Data Needs for CDD Estimate

Element	Frequency	Source
1. Disposal Data for States [Maine, Kansas, Massachusetts, Maryland, South Carolina, Washington, Florida]	Annually (1)	State solid waste webpages
2. Number of Residential Building Permits	Annually	US Census Bureau website
3. MSW Disposal Quantity	The most recent State of Garbage in America Survey (2)	Biocycle magazine
4. CDD Diversion Quantity from States [Maine, Maryland, Virginia, Texas, Pennsylvania, South Carolina, Colorado, Massachusetts, Florida, Washington, New Jersey]	Annually (1)	State solid waste webpages
5. Number of CDD Processing Facilities in the US	Use the most recent inventory of facilities (3)	Table in this report; compiled from State solid waste webpages
6. Amount of RAP Recycled	Publication date of NAPA report	NAPA website

Notes

- 1) It is recommended to update the facility CDD disposal and diversion facility quantity listing of states every 3-5 years to have the most recent, relevant state-wide information reflected.
- 2) As discussed in the report, alternative methodologies that rely upon a separate bottom-up estimate of MSW disposal quantity or using the USEPA MSW Facts and Figures disposal figure may be used as an alternative MSW-disposal basis.
- 3) It is recommended to update the facility inventory every 3-5 years to allow for a more robust estimate that is reflective of recent conditions.